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3 July 1985

# USSR Report

## CHEMISTRY

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# USSR REPORT

## CHEMISTRY

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ADSORPTION

UDC 535.34

## ADSORPTION EFFECT ON ABSORPTION SPECTRA OF COMPLEX ORGANIC COMPOUNDS

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA in Russian No 1, Jan-Feb 85
(manuscript received 21 Nov 83) pp 8-11

GORBUNOVA, L. Yu., RYZHIKOV, B. D. and SENATOROVA, N. R., Chair of General Physics, Physics Faculty, Moscow State University

[Abstract] One source of error in spectroscopic determinations of organic compounds lies in adsorption of the compound in question to cuvette walls. Depending on the configuration of the cuvette, such errors may approach 10% of the quantified value. Studies with rhodamine 6Zh [sic] have shown that the errors can be corrected by employing two cuvettes differing in path-length filled with solutions of equivalent concentrations, employing the expression $d_1S_1/V_1 = d_2S_2/V_2$, where d is the pathway length length, S the surface area, and V the volume. Since surface adsorption phenomena are diffusion-dependent, sufficient time must be allowed for the establishment of equilibrium conditions before readings are taken. Figures 2; references 2: 1 Russian, 1 Western.
[237-12172]

UDC 541.183.5:546.791

## PHYSICAL-CHEMICAL STUDY OF ADSORPTION OF URANIUM FROM SOLUTIONS

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 84,
pp 123-125

NURIYEV, A. N., ABDULLAYEVA, R. S., SHIK, E. I. and MIRZAI, DZh. I., Institute of Inorganic and Physical Chemistry, AzSSR Academy of Sciences

[Abstract] A study is presented of the mechanism of adsorption of uranium by mixed silicate adsorbent from dilute solutions modeling sea water and from natural sea water by IR spectral and derivatographic methods. The studies confirm the chemical mechanism of adsorption of uranium by the mixed silicate adsorbent from dilute solutions. The products of adsorption of uranium by the adsorbent from a uranyl nitrate and sodium tricarbonate uranylate solution contain the basic adsorption bands of both the sorbent and the corresponding form of uranium. This confirms the presence of a chemical interaction between the adsorbent and products of adsorption forming water insoluble compounds on the surface of the adsorbent. Figure 1, references 5 Russian.
[203-6508]

UDC 661.183.12

## ADSORPTIVE ACTIVITY OF FIBROUS MATERIALS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 3, Mar 85
(manuscript received 31 Jan 83) pp 656-658

VLASOV, L. G., TRUSHINA, T. M. and BOCHAROVA, T. P., All-Union Scientific Research Institute of the Textile and Clothing Industry

[Abstract] An evaluation was conducted on the physical characteristics of fibrous textile materials in relation to their adsorptive capacity. The parameters analyzed were weave patterns and surface area, using phosphorylated cotton tricots as a model material. The analytic data demonstrated that the weave pattern has a significant effect on adsorptive capacity, since the density of the weave determines the volume and surface area of fibers available for adsorption. Both factors should be maximized for preparation of highly efficient ion-exchange adsorbents based on cotton fibers. Figures 1; references 9 (Russian).
[241-12172]

UDC 677.529.021.125.52:547.211

## REACTION OF METHANE WITH CHLORINATED SURFACE OF CARBONACEOUS FIBERS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58 No 3 Mar 85
(manuscript received 1 Jul 83) pp 659-661

IVIN, V. D., LEVIT, R. M., MALKOV, A. A. and SMIRNOV, Ye. P., Leningrad Branch, All-Union Scientific Research and Planning Institute of Synthetic Fibers

[Abstract] Kinetic and chemical studies were conducted on methane modificat' of the surface of carbonaceous fibers--cellulose hydrate and cellulose polyacrylonitrile--to provide better understanding of cellulose modification. Following chlorination of the cellulose samples under a current of dry chlorine at 350°C at a pressure of 0.1 MPa, the samples were exposed to methane current under a pressure of 0.02-0.1 MPa at 100-600°C. Methyl group replacement of Cl commenced at ca. 200°C and was completed at 600°C. The energies of activation for the addition of methyl groups for the hydrated and polyacrylonitrile celluloses was quite similar, 48 and 50 kJ/mole, respectively. Successive methylation and chlorination (with $CCl_4$) resulted in lamination with carbon layers. Improvements in tensile strength were obtained with 8-10 layers, while a further layering of carbon rendered the product friable. Figures 3; references 6: 5 Russian, 1 Western.
[241-12172]

AEROSOLS

UDC 681.785.5:541.182.2/.3:53.089.6

# PROBLEMS OF CALIBRATION OF AEROSOL SPECTROMETERS AND PROCESSING OF MEASUREMENT DATA

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 47, No 1, Jan-Feb 85
(manuscript received 29 Jul 83) pp 48-53

LEKHTMAKHER, S. O., All-Union Scientific Research Institute of Physical-Technical and Electronic Measurements, Mendeleyevo, Moscow Oblast'

[Abstract] The influence of nonlinearity of signals and polydispersion of a calibrated aerosol in the determination of the calibration equation of a spectrometer is studied, assuming that the polydispersion of the calibrating aerosol is greater than 0, but that the natural expansion of the spectrometer is slight in comparison to the channel width. The problem is reduced to a task in mathematical programming for a nonlinear goal function with linear limitations. The program reconstructs the spectra for various aerosol particle sizes for the A3-5 instrument. The accuracy of the program is estimated. Figure 1; references 4 Russian.
[186-6508]

ANALYTICAL CHEMISTRY

UDC 541.15+541.515

## SPIN TRAPS IN IDENTIFICATION OF RADICALS IN RADIOLYSIS OF METHYLAMINE AND DIMETHYLAMINE

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 26, No 1, Jan-Feb 85 (manuscript received 11 Jul 84) pp 63-70

O IN KHVAN and BELEVSKIY, V. N., Chair of Electrochemistry; Radiation Chemistry Laboratory, Moscow State University

[Abstract] Spin trap technology was utilized in the identification of radicals formed on gamma radiolysis of methylamine and dimethylamine at temperatures of -196 to +20°C and radiation dosage of 0.01-0.1 Mrad ($2.5 \times 10^{16}$ eV/ml·sec). The spin traps utilized were tertnitrosobutane, tertbutylmethylene nitron, and 2,4,6-tritertbutylnitrosobenzene. Two basic types of radicals were formed--the aminoradicals MeN·H and $Me_2N^{\cdot}$, and the alpha-aminoalkyl radicals $C^{\cdot}H_2NH_2$ and $C^{\cdot}H_2NHMe$--which arose from ion-molecular reactions of the primary cation radicals $MeNH^{+\cdot}_2$ and $Me_2NH^{+\cdot}$. Formation of $Me_2N^{\cdot}$ resulted from proton transfer from the cation radical, while formation of $C^{\cdot}H_2NHMe$ came about from hydrogen atom transfer. Figures 3; references 11: 4 Russian, 7 Western.
[221-12172]

UDC 542/61:543/064

## USE OF POTASSIUM DIBUTYLDITHIOPHOSPHATE FOR ADSORPTION OF COPPER, ZINC AND LEAD IN MARINE WATER ON ACTIVATED CHARCOAL AND ATOMIC ABSORPTION ANALYSIS

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 26, No 1, Jan-Feb 85 (manuscript received 25 Nov 83) pp 70-73

RODIONOVA, T. V., SIMONOVA, L. N. and SHEYKH, M. S., Chair of Analytical Chemistry, Moscow State University

[Abstract] Technical details are presented for the analysis of copper, zinc and lead in marine water by atomic absorption spectroscopy, using preliminary concentration of the metals on activated charcoal via potassium dibutyldithiophosphate (DBDTP). Preliminary studies on adsorption under static conditions in the presence of K-DBDTP in relation to pH showed that combined adsorption and concentration of the Co-, Zn- and Pb-DBDTPs occurs at pH 7.5-10. After adsorption, the complexes were disrupted by $HNO_3$ filtered, and extracted with

methylisobutyl ketone. For atomic absorption analysis the extracts were introduced into $C_2H_2$+ air flame. Figures 2; references 8: 4 Russian, 4 Western.
[221-12172]

UDC 543.42:547.972.33

## IONIC ASSOCIATIONS OF MORIN AND QUERCETIN WITH CATIONIC SURFACTANTS AND THEIR ANALYTIC UTILIZATION

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 53, No 3, Mar 85 (manuscript received 5 Dec 83) pp 278-283

VASIL'CHUK, T. A., PILIPENKO, A. T. and VOLKOVA, A. I., Institute of Colloid Chemistry and Water Chemistry imeni A. V. Dumanskiy, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] A fluorometric assay was devised for the analysis of morin and quercetin in pure states and as components of medicinal preparations. Trials with the cationic surfactants showed that both compounds formed ionic complexes with etoniy [sic] and cetyl pyridinium chloride, but that only the complexes with the former surfactant fluoresced at 540 nm following excitation at 436 nm. Morin and quercetin were extracted with ethanol at 70-80°C for 10-15 min, followed by addition of $10^{-2}$M etoniy to the cooled solution and volumetric adjustment with pH 7.5 acetate buffer. The lower limits of sensitivity of the fluorometric assay for morin and quercetin were, respectively, $5 \times 10^{-7}$ and $5 \times 10^{-6}$ M. Figures 4; references 19: 3 Ukrainian, 16 Russian.
[218-12172]

UDC 543.42.542.61

## EXTRACTIVE-PHOTOMETRIC DETERMINATION OF Rh(III) AS TIN BROMIDE COMPLEXES WITH TRIBENZYLPHOSPHINOXIDE

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL In Russian Vol 53, No 3, Mar 85 (manuscript received 5 Nov 83) pp 291-292

DANILOVA, V. N., SHILINA, G. V. and FESHCHENKO, N. G., Kiev Technologic Institute of the Food Industry; Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Technical details are presented on the extraction of Rh(III) in the form of $SnBr_2$ complexes with tribenzylphosphinoxide (TBPO), and subsequent spectrophotometry of the chloroform solutions at 400 nm for the determination of Rh(III). The molar extinction coefficients for the rhodium complexes at 400 and 300 nm are, respectively, $2.6 \times 10^4$ and $7.5 \times 10^4$. The sensitivity of the method was found to be equivalent to standard assay techniques; however, TBPO

was found to offer greater selectivity and permits rapid determination of rhodium in the presence of iridium, osmium, ruthenium and the nonferrous metals. Figures 3; references 4 (Russian).
[218-12172]

UDC 543.43

## ATOMIC ABSORPTION ASSAY OF BERYLLIUM IN NATURAL OBJECTS, SOILS AND NATURAL WATERS

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 51, No 4, Apr 85 (manuscript received 21 Nov 83) pp 408-412

SAMCHUK, A. I., BONDAR', T. K. and KOKOT, T. K., Institute of Geochemistry and Physics of Minerals, UkSSR Academy of Sciences, Kiev

[Abstract] An atomic adsorption method for assay of beryllium in natural objects was developed. In presence of accompanying elements, atomic adsorption of beryllium will vary to a considerable degree. For this reason, beryllium needed to be extracted and concentrated prior to actual assay. It was established that beryllium can be almost quantitatively extracted by acetylacetone in $CCl_4$ and toluene at pH of the aqueous phase 6-8 in presence of trilon B. Specific procedures for determination of beryllium in water, soil and minerals were reported. The absolute limit of detection for beryllium by this method was $5 \cdot 10^{-11}$ g. Figures 3; references 10: 9 Russian, 1 Western.
[249-7813]

BIOCHEMISTRY

UDC 547.495.6'496.3.07

## N- AND O-CARBAMOYL AND THIOCARBAMOYL DERIVATIVES OF BETA-LACTAM ANTIBIOTICS

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 3, Mar 85 (manuscript received 6 Apr 84) pp 339-342

PETRULYANIS, L. N., VEYNBERG, G. A., KONONOV, L. I., DREYBANTE, I. I. and LUKEVITS, E. Ya., Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga

[Abstract] In order to expand the armamentarium of beta-lactam antibiotics, novel N- and O-carbamoyl and thiocarbamoyl derivatives of these antibiotics were synthesized and tested for activity on Staphylococcus aureus. Reaction of 6-ureido- and 6-thioureidopenicillanic acids and 7-thioureidodeacetoxycephalosporanic acids with carboxylic acid acetyl halides and benzoylisocyanate led to the synthesis of N-acylureido- and N-acylthioureido derivatives of the beta-lactams. The compounds were characterized by moderate antibacterial activity, but transition from the ureido derivatives to the thioureido derivatives with identical acyl groups gave more potent agents. Reaction of 6-alpha-hydroxypenicillanic acid and trichloroethyl 6-alpha-hydroxypenicillanic acid with isocyanatosilanes and subsequent hydrolysis of the N-silylisocynate groups resulted in the preparation of 6-carbamoyloxypenicillanic acid, 6-thiocarbamoyloxypenicillanic acid, and trichloroethyl 6-carbamoyloxypenicillanic acid. References 7: 1 Russian, 6 Western.
[243-12172]

UDC 547.869.07

## SYNTHESIS OF 3,4,7,8-BIS(3-R-BENZO)-2,6-DITHIA-1,5-DIAZA-2,6-DIHYDROANTHRACENE-2,6-BISDIOXIDES

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 3, Mar 85 (manuscript received 21 Feb 84; in final form 6 Aug 84) pp 343-345

BURMISTROV, K. S., VAKULENKO, A. V. and BURMISTROV, S. I., Dnepropetrovsk Institute of Chemical Technology imeni F. E. Dzerzhinskiy

[Abstract] As part of a program for the search for novel bioactive compounds combining dibenzthiazine and indole rings, synthesis of 3,4,7,8-bis(3-R-benzo)-2,6-dithia-1,5-diaza-2,6-dihydroanthracene-2,6-bisdioxides was attained by the oxidation of 3,4,7,8-bis(3-R-benzo)-2,6-dithia-1,5-diaza-1,2,5,6-tetrahydroanthracene-2,6-bisioxides by lead tetraacetate in acetic acid. Derivatives of this novel heterocyclic quinoid system were also prepared by oxidation with phenyliodoisodiacetate in benzene. References 9: 5 Russian, 4 Western.
[243-12172]

CATALYSIS

UDC 541.18.02:54-44

## STUDY OF STRUCTURE OF BIMETALLIC CATALYSTS Rh-Pd and Rh-Ir

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 47, No 1, Jan-Feb 85
(manuscript received 18 Aug 83) pp 165-168

KOCHETKOVA, Ye. I., PLAVNIK, G. M., RUZINOV, V. L. and SOKOLOVA, N. P.,
Institute of Physical-Chemistry, USSR Academy of Sciences, Moscow

[Abstract] X-ray and spectral studies of the bimetallic adsorbents Rh-Pd/$SiO_2$ and Rh-Ir/$SiO_2$ were undertaken. Specimens of highly dispersed metals and alloys based on them were prepared by saturating aerosil with solutions of chloride salts of the metals, composition of metals 5-10% by weight of the content of the carriers. The results of the X-ray and Ir studies of chemosorbed test molecules indicated that bimetallic adsorbents represent a complex system in which mutual diffusion of the metals into each other occurs, leading to a change in the chemosorption properties of the system. Figures 4; references 7: 5 Russian, 2 Western.
[186-6508]

UDC 541.128

## CATALYTIC ACTIVITY AND ACIDITY OF Ce-ZEOLITES

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 26, No 1,
Jan-Feb 85 (manuscript received 18 Nov 83) pp 40-43

VISHNETSKAYA, M. V., TAKHTAROVA, G. N. and TOPCHIYEVA, K. V. (deceased),
Chair of Physical Chemistry

[Abstract] Studies were conducted on the catalytic activity and acidity of Ce-zeolites ($Ce^{3+}$ 45% and $La^{3+}$ 20%, or $Ce^{3+}$ 80%) in the cracking of isopropylbenzene. The initially high catalytic activity diminished after 8-10 oxidative regenerations, but was recoverable after treatment with hydrogen at 550°C for 2 h. Determination of acidity by thermodesorption of ammonia indicated that multiple regeneration leads to a significant drop in the number of chemosorption sites. Treatment of fresh Ce-zeolite samples with hydrogen results in the appearance of weak sites that do not significantly affect catalytic activity. Figures 2; references 5: 1 Polish, 3 Russian, 1 Western.
[221-12172]

UDC 547.214-125+547.313.4:66.095.253.73:661.183.6+546.74

## ALKYLATION OF ISOBUTANE BY n-BUTENES ON DEALUMINATED TYPE Y Ni-ZEOLITES

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 26, No 1, Jan-Feb 85 (manuscript received 25 Nov 83) pp 43-47

PLAKHOTNIK, V. A., STRYUCHKOV, A. V., TOPCHIYEVA, K. V. (deceased), BURENKOVA, L. N. and MORTIKOV, Ye. S., Chair of Physical Chemistry, Moscow State University; Institute of Organic Chemistry imeni N. D. Zelinskiy

[Abstract] A comparative study was conducted on the catalytic activities of Ca-Ni-decationated zeolites and dealuminated type Y zeolites in the alkylation of isobutane by n-butenes. Maximal activity was shown by zeolites with Si/Al ratio of 3.49. The contributions of $Ni^{2+}$ and $H^{+}$ to the transformation of isobutane are variable, with the butenes undergoing oligomerization on the protonic sites. The nickel cations in the zeolite prevent extensive oligomerization due to transfer of hydride ions from isobutane molecules to the olefins. Figures 1; references 11: 10 Russian, 1 Western.
[221-12172]

UDC 541.13;541.128.5;546.96

## POISONING OF CATALYTIC RUTHENIUM ELECTRODES IN THIOUREA SOLUTIONS

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 26, No 1, Jan-Feb 85 (manuscript received 14 Nov 83) pp 79-82

SUTYAGINA, A. A., BATUROVA, M. D., VOLCHKOVA, I. L. and SEMENENKO, M. N., Chair of General Chemistry

[Abstract] Studies were conducted on the mechanism of poisoning of Ru/Pt electrodes of sulfur by employing radiolabeled thiourea and hydrogen sulfide solutions in 0.1 N sulfuric acid. Using a combination of Auger spectroscopy and electronography resulted in the identification of $RuS_2$ and elemental sulfur on the surface of the electrode. Determinations of the effects of these factors on hydrogen adsorption to the electrode demonstrated that adsorption of hydrogen was diminished. In low-level poisoning every sulfur atom excludes 3-4 hydrogen atoms from the ruthenium surface; as the degree of poisoning approaches 64%, the number of hydrogen atoms excluded per sulfur atom drops to 1.4. Analysis of the I vs $E_r$ plots showed that with poisoning the adsorbed hydrogen became energetically nonhomogenous. Figures 2; references 8: 5 Russian, 3 Western.
[221-12172]

UDC 541.128.34:541.44:542.941.7:546.262.3-31

## MAGNESIUM-HYDRIDE CATALYTIC SYSTEMS IN HYDROGENATION OF CARBON MONOXIDE

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 26, No 1, Jan-Feb 85 (manuscript received 21 Oct 83) pp 94-99

LUNIN, V. V., KRYUKOV, O. V., VERBETSKIY, V. N. and LAPIDUS, A. L., Chair of Petroleum Chemistry and Organic Catalysis, Chair of Physics and High Pressure Chemistry; Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences

[Abstract] A number of magnesium hydride systems were subjected to redox treatment at 370°C to ensure partial degradation of the system and increase the surface area with a phase of catalytically active nickel for hydrogenation of carbon monoxide. Maximal activity was obtained by oxidation of $Mg_2NiH_{4.0}$ in air for 0.5 h, while a further increase in the duration of thermooxidative treatment led to a ca. 2.5-fold loss of activity. The loss of catalytic activity was ascribed to the formation of $MgNiO_2$. Maximum degree of CO conversion by hydrogen was obtained at 450-500°C, with ca. 50 mole% yield of $CH_4$ and ca. 40 mole% yield of $CO_2$. Introduction of low concentration of copper resulted in almost complete inhibition of carbon monoxide hydrogenation, while addition of La or Zn improved the stability and efficiency of the catalyst. Figures 3; references 12: 7 Russian, 5 Western.
[221-12172]

UDC 541.127.542.98:546.654

## CATALYTIC ACTIVITY OF $Zr_2$-Pd-H SYSTEMS IN TRANSFORMATION OF 1-HEXENE

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 26, No 1, Jan-Feb 85 (manuscript received 25 Nov 83) pp 99-103

ANISOCHKINA, Ye. N., AKBASOVA, A. R. and LUNIN, V. V., Chair of Petrochemistry and Organic Synthesis

[Abstract] The present study represents the first report on the catalytic activity of $Zr_2Pd$ intermetallide hydride in the hydrogenation and isomerization of 1-hexene. Treatment of the intermetallide at 700°C with hydrogen yielded $Zr_2PdH_{2.7}$ (I), which was an effective catalyst for the hydrogenation and isomerization of 1-hexene over a wide temperature range (20-500°C). Rapid decrease of initial activity of I was due to a decrease in hydrogen dissolved in the crystalline lattice, and affected the concentration of active hydrogen on the surface of I. Redox treatment of I markedly enhanced the activity, stability and selectivity in the hydrogenation of 1-hexene. Kinetic studies will have to be conducted with this system to fully evaluate the mechanism of action. Figures 2; references 10: 7 Russian, 3 Western.
[221-12172]

UDC 66.094.187:[661.723.63+661.723.64]

## OBTAINING CHLOROETHYLENES BY CATALYTIC OXIDATIVE DEHYDROGENATION OF POLYCHLOROETHANES

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 2, Feb 85 pp 73-75

ANTONOV, V. N., ROZHKOV, V. I. and ZALIKIN, A. A.

[Abstract] Dehydrogenation of chloroethanes is normally a multistep process with various side reactions producing unwanted products. Catalytic dehydrogenation of monochlorethane was carried out with a 4% Cu catalyst on silica gel promoted with 2% Pd at 250-400°C, with chloroethane:air molar ratios of 1:1.5 to 1:5, and with residence times of 1-20 s. This gave up to 85% conversion rates, but yields of vinyl chloride did not rise over 17% due to competing dehydrochlorination and combustion reactions. Dehydrogenation of 1,1,2-trichloroethane using a 3% Cu with 1.8% Ca catalyst on aluminosilicate gave yields of 55-60% tri- and perchloroethylene at 395-410°C. Using Pd or Co promoters, yields increased to 70-75%; recycling raised this to 85%. Dehydrogenation of 1,1,2,2-tetrachloroethane gave similar results. Silica gel catalysts also gave yields of 80-86%, with increases to 90-92% using Co or Pd promoters and analogous results with copper-chrome spinel coprecipitated with $Cr_2O_3$ or copper silicide on carborundum. Figures 3; references 8: 1 Russian, 7 Western.
[226-12672]

UDC [661.566.4:66.097.322].001

## USE OF KAOLIN WOOL FOR HIGH TEMPERATURE RECOVERY OF PLATINUM METALS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 2, Feb 85 pp 102-104

TELYATNIKOVA, T. V and KARAVAYEV, M. M.

[Abstract] In nitric acic synthesis, direct losses of catalyst at operating temperatures of 880-920°C are 0.16-0.17 g Pt/t $H_2NO_3$, largely due to the relative ineffectiveness of standard fiberglass filters. Kaolin wools VKM-1 and VKV-1 have fiber sizes similar to fiberglass STV-20, but are capable of operating at temperatures up to 950-970°C before they begin to lose mechanical stability due to a shift in the phase of their main component--alumina. They do not decompose oxides of nitrogen or lower their yield. Measurements of their hydraulic resistance showed that it could be described by a second-order equation, with coefficients given for various temperature levels; thicknesses under 10 mm generally showed relatively low resistance. Lower gas speeds would also tend to shift the proportion of Pt from oxide to metallic particles which are more easily captured. References 5 (Russian).
[226-12672]

UDC 541.128.2:546.271.93

## CATALYTIC DECOMPOSITION OF $BH_4^-$ ON Ir

Vilnius TRUDY AKADEMII NAUK LITOVSKOY SSR: SERIYA B KHIMIYA, TEKHNIKA, FIZICHESKAYA GEOGRAFIYA in Russian No 6, Nov-Dec 84
(manuscript received 27 Jul 83) pp 3-9

VAL'SYUNENE, Ya. I. and YURYAVICHYUS, A. Yu., Institute of Chemistry and Chemical Technology, Lithuanian SSR Academy of Sciences

[Abstract] An analysis was conducted on the reaction conditions under which $BH_4^-$ is oxidized to $B(OH)_4^-$ on powdered Ir. The data demonstrated that the rate of decomposition increases with an increase in the concentration of $BH_4^-$, the temperature, and the amount of catalyst, but decreases with an increase in the pH. The energy of activation was determined as 48.5 ± 1 kJ/mole on the basis of the velocity at different temperatures in the 20-80°C range. The rate of the reaction at this temperature range and 0.0069-0.258 M $BH_4^-$ in 1 M NaOH was expressed by the equation $\bar{v} = k(c_{BH_4^-}^{0.6})(c_{OH^-}^{-0.6})$. Figures 5; references 7: 6 Russian, 1 Western.
[222-12172]

UDC 543.253:577.158

## BIOCATALYTIC ENHANCEMENT OF ELECTRODE REACTIONS. PART 10. MACROKINETICS OF $H_2O_2$ REDUCTION ON ROTATING PEROXIDASE/GRAPHITE ELECTRODES

Vilnius TRUDY AKADEMII NAUK LITOVSKOY SSR: SERIYA B KHIMIYA, TEKHNIKA, FIZICHESKAYA GEOGRAFIYA in Russian No 6, Nov-Dec 84
(manuscript received 14 Feb 84) pp 34-40

YASAYTIS, Yu. Yu., RAZUMAS, V. Y. and KULIS, Yu. Yu., Institute of Biochemistry, Lithuanian SSR Academy of Sciences

[Abstract] The nature of $H_2O_2$ reduction on graphite electrodes with immobilized horseradish peroxidase or lactoperoxidase was followed at 25°C in a rotating electrode device, to determine the contribution of the enzymes to electroreduction. The enzymes were covalently linked to the activated graphite surface via carbodiimide. The effects of the enzymes consisted in a reduction of the energy of activation by 14.5 kJ/mole, with the oxidized forms of the enzymes reacting with reduced quinoid groups of the surface of the electrode to regenerate the active form of the immobilized enzyme. The calculated $V_{max}^s/K$ values for the peroxidase and lactoperoxidase were $5.5 \times 10^{-6}$ and $2.6 \times 10^{-6}$ cm/sec, respectively. The latter figures resulted in the estimate that the number of active peroxidase sites on the electrode was $2.31 \times 10^{-16}$ moles/cm$^2$, and of lactoperoxidase $1.23 \times 10^{-16}$ moles/cm$^2$. Figures 2; references 23: 3 Russian, 20 Western.
[222-12172]

UDC 541.17+543(226+227+8)

## FORMATION OF IRON-CHROMIUM CATALYSTS FOR OXIDATION OF AMMONIA IN ULTRASONIC FIELD

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 1, Jan-Feb 85
(manuscript received 10 Sep 84) pp 21-23

ROMENSKIY, A. V., POPIK, I. V., LOBOYKO, A. Ya. and ATROSHCHENKO, V. I.,
Severodonetsk Production Association 'Azot'.

[Abstract] Results are presented from studies of the formation of Fe-Cr catalyst for oxidation of ammonia in an ultrasonic field. Catalyst specimens were prepared from reactive nitrates of iron and chromium by ultrasonic homogenization in a glass sphere 80 mm in radius placed in a water-cooled jacket. X-ray structural analysis of the catalyst produced by mixing and ultrasonic homogenization indicated that the composition of the catalysts corresponds to $Fe_2O_3$ - $Cr_2O_3$. The mechanism of ultrasonic homogenization involves cavitation erosion, with ultrasonic crushing of the substances occurring under the influence of shock waves arising as cavitation cavities collapse. This allows a final product with extremely fine dispersion to be produced, which influences its density, mechanical properties and heat resistance. The iron-chromium catalyst produced by ultrasonic homogenization is stronger and more active than other catalysts of the same composition. Figures 2; references 4 (Russian). [180-6508]

UDC 66.094.37:661.53

## USE OF CATALYTIC HEAT GENERATORS IN PRODUCTION OF SYNTHETIC AMMONIA

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 1, Jan-Feb 85
(manuscript received 10 Mar 84) pp 47-50

ZUBKOVA, K. A. and UKRAINSKIY, V. I., Rubezhnoye Branch, Voroshilovgrad
Machine Building Institute

[Abstract] Modern ammonia synthesis plants allow significant reductions in cost of raw materials, power and capital investment per ton of ammonia, but do generate large quantities of stack gases with high temperature and content of harmful substances. A method of catalytic combustion of fuel developed at the Institute of Catalysis, Siberian Department, USSR Academy of Sciences, allows both a savings of fuel and a reduction in the harmful substances formed in the production of ammonia. In catalytic generators, the heat of combustion of fuel is realized in a fluidized bed of catalyst allowing complete combustion and simultaneously eliminating the formation of oxides of nitrogen in the combustion products. The use of such generators can significantly reduce the consumption of natural gas as fuel and decrease the formation of harmful impurities emitted into the atmosphere with the stack gas. Further similar improvements can be achieved by new and promising ammonia installations implementing the steam conversion process for natural gas in a tubular reactor with balanced tube pressures. The authors have experimently determined the productivity of a deep oxidation catalyst and selected optimal conditions for the

process. A laboratory installation burned natural gas in air on effective copper-chromium catalysts intended for deep oxidation of hydrocarbons for catalytic heat generators. A mathematical model of the process is presented. The experimental studies and calculations performed show the desirability of using catalytic heat generators with combustion of natural gas in a fluidized bed of catalyst in the production of ammonia. The use of catalytic combustion rather than the presently used flame burning can decrease the consumption of natural gas per ton of ammonia and reduce air pollution as well. Figures 3; references 8 (Russian).
[180-6508]

UDC 54-14.621.793:539.234

PRODUCTION OF CATALYSTS ON METAL CARRIERS WITH OXIDE COATINGS BY CONDENSATION METHODS

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 1, Jan-Feb 85
(manuscript received 5 Nov 84) pp 23-28

SKARCHENKO, V. K., Institute of Gas, Ukrainian SSR Academy of Sciences

[Abstract] A study was made of several patterns determining the mechanical strength of catalysts with oxide coatings. Insoluble solid substances were mechanically crushed to a particle size of less than 45 μm. Stainless steel chips 20-30 x 2-3 x 0.3 mm were used as the carrier after degreasing and heating to 850°C. The carriers were immersed in a paste prepared by adding the crushed powder to a solution of aluminum nitrate in water, after which they were dried at room temperature for 14-16 hours, then at 110°C for one hour and 300°C for one hour, then roasted at 800°C for one hour. The influence of individual components of the mixture on the strength of the coatings was studied. Strength was estimated based on the relative quantity of coating retained intact after impact loading by ten impacts with a steel plate. Aluminophosphate coatings, as well as mixed coatings with oxides of aluminum, cobalt, nickel, chromium and copper with nitrate binders were found to be promising for creation of a new technology for the production of catalysts on metal carriers with oxide substrates with coatings applied by condensation methods. References 16: 14 Russian, 2 Western.
[180-6508]

UDC 541.128.3:541.18.02:66.094.187.3

## STRUCTURE AND DEHYDROGENATION CHARACTERISTICS OF Mo/Cr CATALYSTS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 2, Feb 85
(manuscript received 31 May 83) pp 316-322

PETROV, I. Ya., TRYASUNOV, B. G. and EL'BERT, E. I., Kuzbass Polytechnic Institute

[Abstract] Detailed structural studies were conducted on the $MoO_3$-$Cr_2O_3$ system in dehydrogenation of isoamylenes into isoprene to determine the nature of the active component in the catalytic system. X-ray diffraction analysis and IR spectra indicated that within a 10-80 wt% $Cr_2O_3$ concentration $Cr_2(MoO_4)_3$ is present, and accounts for the dehydrogenation. $Cr_2(MoO_4)_3$ is formed by $MoO_4$ tetrahedrons and $CrO_6$ octahedrons. When the concentration of $Cr_2O_3$ is outside this range, only $MoO_3$ and alpha-$Cr_2O_3$ phases are identifiable. Maximum catalytic activity was shown by samples containing 10-25 wt% $Cr_2O_3$, with a further increase in the concentration of chromium oxide leading to rapid loss of activity. Figures 3; references 23: 15 Russian, 8 Western.
[210-12172]

UDC 541.128

## HYDROGENATION OF PYRIDINE ON PLATINUM BLACK UNDER HYDROGEN PRESSURE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 2, Feb 85
(manuscript received 25 Jul 83) pp 322-325

SOKOLS'SKIY, D. V., DEMBITSKIY, A. A. and UALIKHANOVA, A.

[Abstract] A detailed study was made of the effects of hydrogen pressure and reaction products on the hydrogenation of pyridine into piperidine on platinum black. The study was conducted with an aqueous pyridine solution at temperatures ranging from 373 to 423°K under hydrogen pressures of 0.5-8.1 MPa. Optimum hydrogen pressure was found to fall within the 0.5-2.5 MPa range, with a further increase resulting in a 2.4- to 2.8-fold decrease in the reaction rate. Concomitantly, at elevated hydrogen pressures, platinum black shows a rapid loss of activity due to poisoning with piperidine. For pressures of 2.0 and 8.1 MPa, the respective energies of activation for the process were calculated at 35.5 $\pm$ 2.0 and 42.2 $\pm$ 2.0 kJ/mole. Figures 3; references 9: 5 Russian, 4 Western.
[210-12172]

UDC: 665.644.2

## TWO-STAGE CATALYTIC CRACKING OF NONSULFUR CONTAINING VACUUM DISTILLATE FROM PARAFFINOUS PETROLEUM IN REACTORS WITH ASCENDING PENETRATING AND SEMI-PENETRATING FLOW ON ZEOLITE-CONTAINING CATALYST

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 84
pp 25-29

BASILI, I. K. and SEID-RZAYEVA, E. M., Institute of Petrochemical Processes, Azerb Academy of Sciences imeni Yu. G. Mamedaliyev

[Abstract] Studies were performed on two-stage catalytic cracking of vacuum distillate from sulfur-free petroleum on zeolite-containing aluminosilicate catalyst in reactors with ascending penetrating and semipenetrating flow, separate extraction of reaction products, with determination of the optimal conditions and balance. Cracking was performed on an equilibrium zeolite-containing aluminosilicate catalyst type NaY of particle size 0.05-0.16 mm, bulk density 0.776 g/cm$^3$, activity index 46-48. The minimum and maximum possible limits of the major technologically-optimal parameters of systems with ascending penetrating and semipenetrating flow for stages one and two of the process were determined on the basis of years of experience. The degree of conversion of the raw material is significantly increased under conditions of high yield of motor vehicle grade gasoline with decrease in the yield of coke. References 7: 6 Russian, 1 Western.
[203-6508]

UDC 541.128:546.3

## INFLUENCE OF CHEMICAL COMPOSITION OF NICKEL CHROMIUM OXIDE CATALYST ON CATALYTIC PROPERTIES IN REDUCTION OF NO WITH CARBON MONOXIDE IN PRESENCE OF OXYGEN

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 84
pp 19-24

GASAN-ZADE, G. Z., VUD, M. E. and MEKHTIYEV, K. M., Institute of Petroleum and Chemistry imeni M. Azizbekov

[Abstract] Results are presented from a study of the phase composition of nickel-chrome-oxide catalysts and their activity in reduction of NO by carbon monoxide in the presence of oxygen. The catalysts were prepared by adding a saturated solution of ammonium carbonate to a mixture of solutions of the nitrates of nickel and chromium with intensive agitation at constant pH = 8. The phase composition was studied on a diffractometer in $CuK_\alpha$ radiation. Activity of the catalysts was determined in a flowing nonradiant reactor, the space velocity of the gas stream being 1000 hr$^{-1}$, volume of the catalyst 3 cm$^3$. The gas was chromatographically analyzed for content of $O_2$, $N_2$, NO, $N_2O$, CO and $CO_2$. The most active nickel-chrome-oxide catalyst in the reaction tested is nickel-chrome-oxide spinel $NiCr_2O_4$. Figures 2; references 7: 5 Russian, 2 Western.
[203-6508]

UDC 541.183.03

## ADSORPTION AND CATALYTIC PROPERTIES OF MODIFIED NATURAL ZEOLITES FOR SULFUR DIOXIDE

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 84, pp 3-5

ZUL'GUGAROV, Z. G., DZHAFAROVA, E. M., DZHAFAROVA, S. A. and NAGDALIYEVA, Yu. R., Institute of Inorganic and Physical Chemistry, Azerb Academy of Sciences

[Abstract] The purpose of this work was to develop a catalyst-adsorbent based on aydag deposit clinoptilolite for use in trapping of $SO_2$ from dilute gas mixtures and subsequent reduction of $SO_2$ to elementary sulfur. Adsorption and catalytic studies were performed in quartz reactors with inside diameter 3-5 cm, height of zeolite layers 7-10 cm, quantity of specimen charged 50 g, particle diameter 3-5 mm. The mixture of air plus sulfur dioxide was fed through the reactor from the bottom upward at 100 ml/min. The greatest adsorption capacity of all adsorbents tested and best reducing activity for $SO_2$ were exhibited by a modified form of clinoptilolite obtained by treatment of the initial specimen with 0.1 n $NH_4NO_3$. References 3 (Russian).
[203-6508]

UDC 661.7:547.292'361.3

## GAS-PHASE ACETOXYLATION OF PROPYLENE ON PALLADIUM CATALYSTS PROMOTED WITH LEAD ACETATE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 3, Mar 85 pp 140-142

MAK, N. Ye., DARMAN'YAN, P. M., SAMTER, L. N., FEDOROVA, N. M. and SHURUPOVA, L. N.

[Abstract] Experiments were designed to test the efficiency of lead acetate-promoted palladium catalysts in gas-phase acetoxylation of propylene, as a possible replacement of bismuth acetate-promoted catalysts. Evaluation of various test results led to the identification of a catalyst consisting of 5% palladium acetate, 4% lead acetate and 13% potassium acetate as optimum for the process and essentially equivalent to the standard palladium catalyst with bismuth acetate promoter. Optimal conditions for acetoxylation of propylene on this catalyst consisted of a pressure of 0.8 MPa, a temperature of 190-195°C, a contact time of 4 sec and molar ratio of acetic acid:propylene:oxygen:inert gas of 1:2.1:0.26:0.87. Under these conditions a conversion rate of 9-10% is the rule, with a selectivity of 90-92%. Figures 3; references 5: 1 Russian, 4 Western.
[230-12172]

UDC 666.192.002,237

## PREPARATION OF SILICON DIOXIDE HYDROSOL FOR USE AS CATALYST SUPPORT

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 3, Mar 85 pp 160-162

FROLOV, Yu. G., SHABANOVA, N. A., KHORKIN, A. A., RESHETNIKOVA, L. V., SUD'INA, R. K., RASTEGIN, Yu. I. and KUZ'MIN, M. P.

[Abstract] To provide a Soviet source of silicon dioxide hydrosol containing ca. 40% $SiO_2$, a preparatory method was developed and the product tested in acrylonitrile synthesis as catalyst support. The essential steps consisted of melting bulk silica in an autoclave at 423-453°K for 1 h under a pressure of 588 kPa to form 30% liquid glass, its addition to 4% $SiO_2$. filtration to remove large particles and application to ion-exchange KU-2-8 ($H^+$) column. The silicic acid effluent from the column. (pH 2.6-3.0) was adjusted with NaOH to pH 8-9 and heated with constant mixing at 373-377°K for 1 h to form seed nuclei 4.5-6.5 nm in diameter. Fresh silicic acid was added at a controlled rate to precipitate on the seeds and allow controlled growth to 18-20 nm. Analysis of the hydrosols prepared in this manner showed a $SiO_2$ concentration of 39.80-40.37%, a mean particle diameter of 18.0-19.7 nm, and less than 0.2% admixtures ($Na^+$, $Fe^{+++}$, $Cl^-$, $SO_4^{--}$). The silicon dioxide hydrosol was found effective as a catalyst support in the synthesis of acrylonitrile by oxidative ammonolysis. Figures 1; references 7: 4 Russian, 3 Western.
[230-12172]

UDC 66.094.37:661.248

## HYSTERESIS IN VANADIUM CATALYSTS DURING SULFUR DIOXIDE OXIDATION

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 3, Mar 85 pp 162-165

IVANENKO, S. V.

[Abstract] A kinetic analysis was conducted on the oxidation of sulfur dioxide on vanadium catalysts, which demonstrated that hysteresis was due to the formation of vanadyl sulfate. The effects and rate of vanadyl sulfate formation were dependent on the conditions of oxidation. Several equations were derived and analyzed graphically for the $K_2S_2O_7 \cdot V_2O_4 + SO_3 = K_2SO_4 \cdot (VOSO_4)_2 + Q$ reaction, yielding mathematical expressions for the relationship between active vanadium compounds and total vanadium concentration in the active component. The activity of the vanadium catalyst was found to depend on its preliminary treatment, with nonadherence to recommended standards yielding catalysts tending to more pronounced hysteresis. Figures 3; references 15: 14 Russian, 1 Western.
[230-12172]

JPRS-UCH-85-008
3 July 1985

UDC 542.973

# CATALYTIC EFFECTIVENESS OF HIGHLY DISPERSED METALS IN LIQUID-PHASE PROCESSES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 3, Mar 85
(manuscript received 19 Dec 83) pp 591-595

ARTEMOV, A. V., LUNINA, M. A. and KHACHATURYAN, A. A.

[Abstract] An attempt was made to systematize available information of the catalytic efficiency of highly dispersed metals in a variety of liquid-phase processes. The available data indicate that finely dispersed metals function as efficient catalysts in a number of situations involving oxidative polymerization of various oils, oxidation reactions, and epoxidations. Other uses have been found in a number of different and distinct polymerization reactions, alkylations, halogenations, hydrogenations, oxosynthesis, and so forth. Comparative studies have shown that finely dispersed metals catalyze various reactions with markedly lower energies of activation than seen with standard catalysts. For example, in the oxidation of tetraline to 1-tetralone the energy of activation calculated for dispersed Co was 30.0 kJ/mole, whereas the energy of activation with the standard cobalt stearate catalyst is 56.5 kJ/mole. In addition, with dispersed metal cobalt both the yield and selectivity of 1-tetralone are significantly improved. The simplicity with which such catalysts can be prepared and the ease of their use suggest that they will find wide application in organic and petrochemical synthesis. Figures 3; references 6 (Russian).
[241-12172]

CHEMICAL INDUSTRY

UDC [661.7:547.586.2](047)

## PRODUCTION OF PHENYLACETIC ACID

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 85 pp 5-8

POZDNYAKOVICH, Yu. V., NAZARENKO, Ye. S. and SHEYN, S. M.

[Abstract] This article presents a summary of the data available in the literature on the synthesis of phenylacetic acid and discusses promising methods for its production. Methods discussed include hydrolysis of phenylacetonitrile, carbonylation of benzyl halides or benzyl alcohol, oxidation of ethylbenzene, interaction of manganese triacetate with benzene, organometallic synthesis and saponification of 1, 1, 1-trichloro-2-phenylethane. Carbonylation of benzyl chloride or benzyl alcohol and cyanation of benzyl chloride in the presence of interphase transfer catalysts are said to be the most interesting industrial methods. References 69: 9 Russian, 10 Eastern European, 50 Western.
[182-6508]

UDC 66.094.17.001:[661.7:547.581.2]

## INFLUENCE OF WATER ON KINETIC PARAMETERS OF HYDROGENATION OF BENZOIC ACID AND ON REACTION RATE UNDER INDUSTRIAL CONDITIONS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 85 pp 10-12

KUL'KOVA, N. V., KONYUKHOV, V. Yu. and TEMKIN, M. I.

[Abstract] Based on the results of measurements of the rate of hydrogenation of benzoic acid on a palladium catalyst performed in a previous work, a quantitative expression is presented for the variation of rate of hydrogenation as a function of water content in the reaction mixture. This is used to calculate the effect of adding water to industrial benzoic acid hydrogenation reactors. It is concluded that whereas under industrial conditions when water is added an increase is observed in the rate of hydrogenation of benzoic acid, this is explained by such effects as a decrease in poisoning of the catalyst by carbon monoxide which is formed as a result of decarboxylation of cyclohexane carboxylic acid or a decrease in the degree of plugging of pores in the catalysts by resinous side products. References 6: 4 Russian, 2 Western.
[182-6508]

UDC 66.094.403:661.715.22 661.7:547.332.33

## PRODUCTION OF VINYL CHLORIDE BY OXIDATIVE CHLORINATION OF ETHANE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 85 pp 12-15

TREGER, Yu. A., GUZHNOVSKAYA, T. D., FEOFANOVA, N. M. and SONIN, E. V.

[Abstract] The reaction of oxychlorination of ethane was studied by varying conditions and catalyst composition over a broad range. The catalyst used was a salt system $CuCl_2$ + KCl on a carrier. The carriers used are different in both chemical composition and pore structure. The data indicated that the process of oxychlorination of ethane is a complex set of both sequential and parallel reactions. It occurs through a stage of intermediate oxidation of hydrogen chloride by oxygen with the formation of chlorine. Wide variation of contact time, concentration and ratio of initial reagents shows that these parameters significantly influence mainly the selectivity of the reaction. The data confirmed the promise of development of a process for production of vinyl chloride by oxidative chlorination of ethane in a fluidized bed of catalyst. The limited selectivity of the process makes it desirable to develop a complex technological system for production of vinyl chloride from ethane with processing of all intermediate and side products. Figures 5; references 2 (Russian)
[182-6508]

UDC 66.092.122:665.612.3

## COLLECTION OF OPTIMAL CONDITIONS FOR OXIDATIVE PYROLYSIS OF NATURAL GAS CONTAINING METHANE HOMOLOGS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 85 pp 18-20

ROMANYUK, I. M., SHEVCHUK, V. U., CHURIK, G. P. and ASTVATSATRYAN, S. A.

[Abstract] Discovery of new gas deposits required the use of natural gas containing significant quantities of methane homologs (up to 40% by weight). It is therefore important to know the maximum possible yield of acetylene which can be obtained by using natural gas containing methane homologs and the optimal conditions for the process. A review of the Soviet literature on the subject is presented, and it is concluded that the process of oxidative pyrolysis of natural gas containing large quantities of methane homologs should be performed at a temperature of 600-620° C, $O_2$/C ratio in the initial mixture 0.56-0.57, mean time spent by pyrolysis gas in reaction zone not over 0.003 s. Figures 2; references 11 (Russian).
[182-6508]

UDC 661.721.41.001

# INFLUENCE OF METHANOL SYNTHESIS CONDITIONS ON SNM-1 CATALYST ON FORMATION OF HIGH-MOLECULAR-MASS PARAFFINS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 85 pp 20-21

LEONOV, V. Ye., SUSHCHAYA, L. E., VYATKIN, Yu. L., BONDAR', P. G. and PRILUTSKIY, A. Ye.

[Abstract] A study was made of the influence of gas composition as well as certain technological parameters of the synthesis process on the formation of high-molecular-weight paraffin hydrocarbons on SNM-1 methanol synthesis catalyst. Experiments were performed in a single-row isothermal reactor at 5-10 MPa, 240-280°C, contact time 0.1-2.5 s, catalyst granule diameter 5 or 9 mm. It was found that under the conditions of synthesis of methanol on low temperature catalyst SNM-1, saturated high molecular weight hydrocarbons are formed from the methanol. The curve describing the variation in yield of high molecular wt. paraffins as a function of temperature passes through a minimum. Increasing the pressure from 5 to 10 MPa increases the yield of hydrocarbons by a factor of 5 to 6. $C_8$-$C_{16}$ hydrocarbons are formed in the greatest quantity, decreasing with increasing number of carbon atoms in the molecule. Figures 3; references 7: 6 Russian, 1 Western.
[182-6508]

COAL GASIFICATION

UDC 662.749.41

## PHENOL COMPOSITION IN HEAVY SHALE OIL. PART 2. OXIDATION OF ALKYLRESORCINOLS

Tallin IZVESTIYA AKADEMII NAUK ESTONSKOY SSR: KHIMIYA in Russian Vol 34, No 1, Jan-Feb-Mar 85 (manuscript received 29 May 84) pp 1-6

POBUL', L. and KLESMENT, I., Institute of Chemistry, Estonian SSR Academy of Sciences

[Abstract] The mechanisms of oxidative destruction of heavy shale oil 5-alkylresorcinols, 4-hexylresorcinol and--for purposes of comparison--several alkylnaphthalenes were examined to determine the levels of such compounds, the effects of refinery techniques, and to ascertain whether such oils can be regarded as a potential source. Alkaline solutions of potassium permanganate disrupted the aromatic nucleus of resorcinol and resulted in the removal of the alkyl chains by beta-disruption leading to the formation of n-alkane mono- and dicarboxylic acids. In addition, frequently, the removal of an alkyl side chain was accompanied by the loss of a carbon atom from the phenol nucleus. Oxidation of alkylresorcinols leads to the formation of a small number of aromatic acids, and it appears that the starting resorcinols contain dihydroxy-naphthalenes. During oxidation of alkylphthalines the unsubstituted ring undergoes preferential disruption with formation of several products. Figures 2; references 8: 7 Russian, 1 Western.
[220-12172]

UDC 662.736:543.54.001.5

## REVERSE GAS CHROMATOGRAPHY OF DEPHENOLATED HEAVY KUKERSITE SHALE OIL

Tallin IZVESTIYA AKADEMII NAUK ESTONSKOY SSR: KHIMIYA in Russian Vol 34, No 1, Jan-Feb-Mar 85 (manuscript received 6 Apr 84) pp 7-10

ARRO, Ya., Institute of Chemistry, Estonian SSR Academy of Sciences

[Abstract] Reverse gas chromatography was conducted on dephenolated heavy shale oil to determine how dephenolation affects the levels of compounds with proton-acceptor groups. Determinations conducted in the temperature range of 304-347°K led to the evaluation of the $V_g^o$ ($m^3/kg$) of 12 organic compounds, along with assessment of their activity coefficients and the enthalpies, free energies, and entropies of mixing at 298°K. The data indicated that dephenolation diminishes

the proton-donor capacity of the heavy shale oil and as a consequence, the solubility of such oil decreases in polar solvents with proton-acceptor characteristics. Figures 2; references 3: 2 Russian, 1 Western.
[220-12172]

UDC 662.67:66.060

STRUCTURE OF ORGANIC BASES OF PRIMARY COAL TARS. PART 2.

Tallin IZVESTIYA AKADEMII NAUK ESTONSKOY SSR: KHIMIYA in Russian Vol 34, No 1, Jan-Feb-Mar 85 (manuscript received 10 Nov 83; in final form 20 Feb 84) pp 11-16

PLATONOV, V., TABOLENKO, N., KLYAVINA, O. and IVLEVA, L., Tula State Pedagogical Institute

[Abstract] A structural analysis was conducted on the organic bases of coal tar obtained by thermal destruction of coal G6, under conditions which excluded high-temperature pyrolysis of coal gases and vapors. The compounds were isolated on TLC, and the chloroform and acetone eluates were subjected to mass spectrometric, elemental and functional analysis, as well as to IR, UV and $^1$H-NMR spectroscopies. On the basis of these results, a series of multicyclic compounds are presented. In addition to nitrogen in the pyridine, piperidine, pyrimidine and pyrrole rings, as well as in the form of amines and amides, these heterocyclic compounds also contained oxygen in quinoid, phenol, ketone, alkoxyl and alcohol groups. Figures 3; references 16: 12 Russian, 4 Western.
[220-12172]

UDC 662.337.2;662.742;662.749.31;54.04

THERMOLYSIS OF ORGANIC SUBSTANCES IN ALUM SHALE (ARGELLITE) FROM MAARDUSKIY DEPOSITS. PART 4. ELEMENT INTERRELATIONSHIP IN ALUM SHALE OIL

Tallin IZVESTIYA AKADEMII NAUK ESTONSKOY SSR: KHIMIYA in Russian Vol 34, No 1, Jan-Feb-Mar 85 (manuscript received 2 Feb 84) pp 17-23

KOKH, R. (deceased) and KIYS, K., Institute of Chemistry, Estonian SSR Academy of Sciences

[Abstract] Regression analysis was conducted for the flotated organic concentrates obtained by thermolysis of alum shale (Argellite) from the Maarduskiy deposits to establish interrelationship patterns for different element pairs. Analysis of the products was conducted after 400-600°C treatment for H-N, H-O, H-S, C-N, C-O, C-S, O-N, O-S, and N-S pairs. High degrees of correlation were found to apply to the C-O and H-S pairs. The proportional increase in $O_2$ to the increase in C, always with a 15-20% excess of oxygen relative to carbon, indicated a direct chemical linkage of the two elements. The strong correlation between the changes in the hydrogen and sulfur concentrations indicated that sulfur loss occurs in the form of hydrogen sulfide. Figures 6; references 1 (Russian).
[220-12172]

UDC 622.7:622.337;622.775

## CHEMICAL CHARACTERISTICS OF OIL SHALE FROM KRASAVA, BULGARIA. PART 2. ENRICHMENT

Tallin IZVESTIYA AKADEMII NAUK ESTONSKOY SSR: KHIMIYA in Russian Vol 34, No 1, Jan-Feb-Mar 85 (manuscript received 29 Jun 84) pp 24-32

KOKH, R. (deceased), AKHELIK, V. and VESKI, R., Institute of Chemistry, Estonian SSR Academy of Sciences

[Abstract] Details are presented on the processing of oil shale obtained from Krasava, Bulgaria, involving a combination of chemical and mechanical processes. Four different types of milling operations were tested with preliminary dilute nitric acid treatment and flotation. As a result of nitric acid pretreatment the finely dispersed sample was enriched in organic matter. The nitric acid decarbonated shale was then subjected to centrifugation in aqueous calcium nitrate, yielding a concentrate with 69% organic matter, or subjected to flotation processing to yield a product containing ca. 63% organic matter.
Figures 2; references 11: 10 Russian, 1 Western.
[220-12172]

UDC 553.983.002.61

## SEMICOKING OF STRATIFIED SAMPLES OF LOWER EOCENE UZBEKISTAN OIL SHALE

Tallin IZVESTIYA AKADEMII NAUK ESTONSKOY SSR: KHIMIYA in Russian Vol 34, No 1, Jan-Feb-Mar 85 (manuscript received 18 Oct 83) pp 33-39

VYSOTSKAYA, V., UROV, K. and SVETOZARSKIY, Ye., Institute of Chemistry, Estonian SSR Academy of Sciences; Experimental Methodological Expedition, Uzbek SSR Ministry of Geology, Tashkent

[Abstract] Low-temperature carbonization was conducted on oil shale obtained from depths of 442.4-449.0 m in Kapali, Uzbekistan, following bitumen elimination, to determine the effectiveness of coalification of the different strata. The yield of products varied with the stratum, depending on the content and composition of organic matter, with kerogen concentration being the primary determining factor. The chemical composition of the insoluble organic matter was similar across the strata, and reflected a high degree of transformation of the basic biological material during shale formation. The gaseous products of coking were remarkable for elevated concentrations of saturated hydrocarbons, giving a volume ratio of saturated to unsaturated hydrocarbons of 8.2.
Figures 4; references 12: 10 Russian, 2 Western.
[220-12172]

UDC 553.983.002.61

## ORGANIC MATTER OF THERMALLY TRANSFORMED OIL SHALE FROM SELENNYAKH, NORTHEASTERN YAKUTIA

Tallin IZVESTIYA AKADEMII NAUK ESTONSKOY SSR: KHIMIYA in Russian Vol 34, No 1, Jan-Feb-Mar 85 (manuscript received 18 Nov 83) pp 40-47

UROV, K., KLUBOV, B. and VYSOTSKAYA, V., Institute of Chemistry, Estonian SSR Academy of Sciences; Northeastern Multifaceted Scientific Research Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Magadan

[Abstract] Analysis of the composition of the organic matter of Devonian Selennyakh (Northeastern Yakutia) bituminoid has shown that the deposits have reached the oil-formation stage. The concentration of aromatic hydrocarbons has reached 72.2% and shows considerable similarity to that of semicoked shale. Thermal treatment revealed high concentrations of the lower isoprenoid alkanes and a pristane:phytane ratio of 1.44. Dicarboxylic acids account for ca. half of the saturated ($C_5$-$C_{18}$) fatty acids in the bituminoid, while the insoluble fraction of the organic matter represents the partially thermodegraded kerogen. The high concentration of isoprenoid alkanes--31.6% of $C_{12}$-$C_{20}$ n-alkanes--points to the importance of the isprenoid structure in kerogen. Figures 5; references 11: 8 Russian, 3 Western.
[220-12172]

UDC 553.983.002.61

## STRATUM-RELATED VARIATIONS IN BITUMINOID COMPOSITION OF OIL SHALE FROM TODINSK, UZBEKISTAN

Tallin IZVESTIYA AKADEMII NAUK ESTONSKOY SSR: KHIMIYA in Russian Vol 34, No 1, Jan-Feb-Mar 85 (manuscript received 23 Mar 84) pp 48-54

SUMBERG, ADA, UROV, K. and SVETOZARSKIY, Ye., Institute of Chemistry, Estonian SSR Academy of Sciences; Experimental Methodological Expedition, Uzbek SSR Ministry of Geology, Tashkent

[Abstract] Bituminoids extracted from the oil shale of the Todinsk deposits in Uzbekistan were analyzed for stratum-composition correlation. Considerably more variation was encountered among the strata of this deposit than commonly encountered among different deposits. While the bituminoid yield in terms of organic matter for a given stratum section was relatively constant, the group composition showed significant changes. A definite relationship prevailed between the bituminoid n-alkanes and the organic matter concentration: the higher the organic matter the lower the n-alkane ($C_{10}$-$C_{17}$) concentration. In addition to aliphatic isoprenoids, cyclic isoprenoids were also present. Therefore, transformation of bituminoids of oil shale has to be analyzed not only in terms of chemical and physical factors, but also the biological contribution as indicated by the indicator value of prostane, phytane and isoprenanes. Figures 3; references 6 (Russian).
[220-12172]

COMBUSTION

UDC 534.222.2+662.612.1

## GAS DYNAMIC EFFECTS ON SPONTANEOUS IGNITION OF ATOMIZED LIQUID FUEL

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 281, No 2, Mar 85
(manuscript received 28 Apr 83) pp 361-363

BORISOV, A. A., GEL'FAND, B. Ye., TSYGANOV, S. A. and TIMOFEYEV, Ye. I.,
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[Abstract] Promoters such as alkyl nitrates can shorten the period of induction of ignition in atomized hydrocarbon or boron-containing fuels, particularly when the mixture or regions of it have an excess of fuel. When the fuel mixture is not in a contained chamber, a chemical promoter may be necessary for ignition to occur, but in closed volumes, gas dynamic effects can also promote ignition. The delay in ignition at constant temperature and constant shock-wave pressure can be significantly altered by perforations in the end of the shock tube. Experiments with perforated areas up to 13.4% of the tube end and using isobutyl-orthocarborane at temperatures of 1000-1600°K showed a clear relation between permeable area and ignition delay. Kerosene, with a higher saturated vapor pressure, showed a weaker effect. In both cases, gas-dynamic rather than chemical factors appeared to determine the time of ignition. Figures 2; references 9: 3 Russian, 6 Western.
[224-12672]

UDC 541.128:536.46

## BEHAVIOR OF AMMONIA IN HYDROCARBON FLAME AND EFFECTS ON ELECTROPHYSICAL ASPECTS OF COMBUSTION

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 3, Mar 85
(manuscript received 14 Sep 83) pp 675-678

TSOY, L. P., BOTOVA, V. I., SHCHERBAKOV, N. D. and FIALKOV, B. S.

[Abstract] An analysis was conducted on the consequence of ammonia introduction into propane-butane flames, to assess individual processes in combustion. The effects on the products of combustion consisted of moderate depression of the concentrations of CO and $CO_2$; in addition, the concentration of $O_2$ showed more profound depression, while the concentration of $H_2$ fell significantly. Electric

field effects consisted of a decrease and delimitation of the negative potential and the reverse changes in the positive potential of the flame. Introduction of ammonia was accompanied by an increase in the number of m/e = 15-41 peaks, where most of the positive ions are concentrated. Maxima were also observed at m/e = 16, 17, and 18 which were ascribed to $NH_2^+$, $NH_3^+$ and $NH_4^+$, respectively. Changes in the burn-out zone were interpreted as reflecting oxidation of ammonia to NO and further oxidation to $NO_2$ with generation of atomic hydrogen. Figures 3; references 7 (Russian).
[241-12172]

UDC 628.542

## THERMODYNAMIC AND KINETIC ASPECTS OF COMBUSTION ELIMINATION OF NITROGEN-CONTAINING WASTE PRODUCTS

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY MINISTERSTVA VYSSHEGO I SREDNEGO SPETSIAL'NOGO OBRAZOVANIYA SSSR: ENERGETIKA in Russian No 4, Apr 85 (manuscript received 13 Jun 83) pp 74-79

BAKHIREV, V. I., candidate of technical sciences, Ivanovo Order of Honor Energy Institute imeni V. I. Lenin

[Abstract] An assessment was conducted on the thermodynamic and kinetic parameters involved in combustion elimination of nitrogenous waste products, based on the assertion that the formation of NO and its decomposition are based on the concentrations of molecular oxygen, nitrogen, hydrogen and NO at the zone of transformation. Assessment was further expanded to cover the reactions $NO + NO = N_2 + O_2$, $2NO + 2H_2 = N_2 + 2H_2O$, and $2NO + 2CO = N_2 + 2H_2O$. Considering the molecular species and their partial pressures at the flame's zone of reaction and the temperatures, a series of mathematical expressions were derived to explain the experimental data on the reduction of NO to $N_2$, which showed high dependence on the actual conditions, i.e., availability of the other molecular species, in the combustion chamber. Figures 3; references 5 (Russian).
[247-12172]

ELECTROCHEMISTRY

UDC: 541.67:669.018

# SOME ELECTRICAL PROPERTIES OF THIN LAYERS OF ELECTROLYTIC In-Te ALLOYS

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 84, pp 97-100

ABASOVA, N. K., ALEKPEROV, A. I. and NOVRUZOVA, F. S., Institute of Inorganic and Physical Chemistry, AzSSR Academy of Sciences

[Abstract] Results are presented from measurements of the electrical properties of indium telluride obtained by an electrochemical method and compared with analogous data for thermal alloys in order to determine possible areas of application of the alloy. Conductivity of indium-tellurium films obtained by the electrolytic method was measured as a function of temperature in the 20-225°C interval. Thin layers of specimens glued to a dielectric base were used. Conductivity increases exponentially with increasing temperature as in a semiconductor, with p-type conductivity. The thermal width of the forbidden zone of the electrolytic alloy, coefficient B and thermal coefficient of resistivity $\alpha$, which decreases with increasing temperature, are determined. Figures 2; references 10: 9 Russian, 1 Western.
[203-6508]

FERTILIZERS

## DELIVERY OF NITRATE FERTILIZERS IN UKRAINE SNAFUED

Kiev RABOCHAYA GAZETA in Russian 22 Mar 85 p 2

[Article by A. Zayets and L. Mokrov, Correspondents of RABOCHAYA GAZETA, Voroshilovgrad-Kiev, "Without saying anything bad...Why is the Severodonetsk Azot plant forced to cut back production of valuable fertilizers!"]

[Text] The third shop of the Azot [Nitrogen] Combine puts out the best ammonium nitrate in the country. The warehouse around it is now packed full of bags containing the product. They are also piled outdoors. The enterprise has been compelled to reduce the production of these fertility "vitamins." There is not enough transportation to haul the product away. Why does this happen? There exists a very serious problem in the transportation of valuable cargo. The chemists have attempted to solve it. Several years ago they proposed that the nitrates be transported in bulk in special freight cars. It was not easy to construct the mineral cars. Now they exist. Each of them saves the state seven thousand rubles per year: There are no bagging costs; the loading-unloading operations are fully mechanized, etc.

While the freight car builders were mastering the production of the new cars, the chemists were busy preparing warehouses to receive fertilizers in mineral cars. They are now found in Kharkov, Poltava, and Sumi Oblasts of the [Ukrainian] Republic. The industrial experiment was organized in 1980. The Kharkov District received 8000 tons of ammonium nitrate in bulk. The results are encouraging. The chemists get good marks for the progressive method of transportation. In 1981, agriculture was shipped 62,000 tons, in 1982, 101,000 tons, in 1983, 187,000 tons, and in 1984, 222,000 tons of ammonium nitrate.

During all of these years not a single complaint was heard from the regional Sel'khozkhimiya [Agricultural Chemistry] Associations. The fertilizer was delivered on time. It appeared that the problem was solved. It was proposed that the volume of deliveries of unbagged nitrate would be brought up to 1.5-2 million tons in the current year, and with allowance for the construction of warehouses, up to 8-10 million tons by 1990. However, an order was received from Ukrsel'khozkhimiya [Ukrainian Agricultural Chemistry] to stop transporting ammonium nitrate in unbagged form. As a result, many years of hard work by the workers of the combine went down the drain. Last fall, Azot was compelled to cut back production by thousands of tons.

Now the tracks approaching the third shop in Severodonetsk are crowded with idle mineral cars. And a huge line of KamAZ'es has built

up alongside the warehouses. Together with the deputy general director P. Sysoyev, let us meet with one of the visitors. The chairman of the department of deliveries to the Kupyansk Rayon Sel'khozkhimiya of Kharkov Oblast, L. Zarya, states that the ammonium nitrate is presently needed by the Kolkhozes for fertilizing the winter wheat crop. It is very difficult to haul it by truck--a lot of trouble with bags during loading and unloading and preparation for spreading the fertilizer on the fields. But it is categorically forbidden to receive fertilizers in boxcars.

Wht? The general director of Azot, B. Leshchina, also attempted to get an answer to this question by writing a letter to the chairman of Ukrsel'-khozkhimiya V. Sakhnenko. The director called attention to the fact that if mineral freight cars are totally abandoned, this will lead to a reduction in production in the first quarter of 1985, the workers of Azot will be unable to provide the agriculture of the republic with the tens of thousands of tons of ammonium nitrate, and every centner of fertilizer adds 4.9 centners to the grain yield at harvest! It soon became clear that the reason why the mineral boxcars were prohibited was the higher combustibility of the material.

The State Institute for the Nitrogen Industry [SINI] conducted a study of this problem. The specialists' report reads: "many years of both Soviet and foreign experience and special studies have confirmed the fact that the unbagged method, due to the elimination of flammable bags, increases the safety of storage and transportation of ammonium nitrate. It would appear that every-thing is clear, it seems that mineral freight cars, besides everything else, prevent fires.

The opinions of the scientists were disregarded. Now at Ukrsel'khozkhimiya they say that due to the shortage of specially equipped warehouses for receiv-ing the mineral cars, the losses are increased and the quality of the fertili-zers lowered. But why be guided by poor managers? The experience of the kolkhozes and sovkhozes in Kharkov, Sumi, and Poltava Oblasts testifies that the losses can be avoided if one learns to store the fertilizers properly. Moreover, certain subdivisions of Ukrsel'khozykhimiya are very willing to receive the fertilizer in bulk. For example, the Poltavans are always requesting this. The benefits are obvious. A mineral car containing 60 tons of material can be unloaded in several minutes, while the unloading of a closed car takes several hours. The chairman of the Kharkov Oblast Sel'-khozkhimiya combine, E. Kaban, writes that they may receive ammonium nitrate, unbagged, in mineral cars but "in view of....the decisions from above."

While the discussion continues, the production of the most valuable products is being cut. It is clear to everyone that the undelivered fertilizer will be paid for by a smaller harvest. Why don't they understand this at Ukrsel'khozkhimiya?

For an explanation we turn to the chairman of the directorate for supplying chemical products of Ukrsel'khozkhimiya, V. Tokarchuk. He places several folders on his desk and says:

"You see, not a single directive permits the transportation of ammonium nitrate in unpackaged form. This material tends to agglomerate and deteriorate

in storage; in the presence of temperature fluctuations and mechanical friction it is capable of spontaneous combustion and even of exploding. Therefore, Soyuzsel'khozkhimiya [All Union Agricultural Chemistry] issued the prohibition on the transportation of fertilizers on mineral cars. We are also fulfilling orders from above. The grievances of our Severodonetsk comrades should not be addressed to us but to Soyuzsel'khozkhimiya."

But, it seems, the bags of Ukrsel'khozkhimiya are more suitable than freight cars for the additional reason that it is easier to hide individual underfulfillment of quotas in them. The director of the shipping department of the Voroshilovgrad Oblast combine of Sel'khozkhimiya, I. Naydysh, tells us:

"Our combine hauls the production of the Severodonetsk Azot on our own trucks. We are quite satisfied with the fertilizer in packaged form. The bags can even be stored in the field. And ammonium nitrate is a rather troublesome cargo. If it rains--and without special crushing devices--it is impossible to break up the agglomerated lumps. Of course, if there were warehouses everywhere, then mineral cars would be appropriate. But if there are none, then without bags, it is very difficult for us to work normally."

"The Severodonetsk Azot combine is far from being our main supplier" continues V. Tokarchuk. "Thus the workers at Stirol [Styrene] in Gorlov and at the Azots in Dneprodzerzhinsk and Circassia supply ammonium nitrate to us only in packaged form. We can permit its transportation in bulk cars only immediately during the period of application of fertilizer to the soil. For this it is also necessary to have the agreement of the organizations receiving it."

We have already cited the letter by the manager of the Kharkov Sel'khozkhimiya, Ye. Kaban, stating that the farmers in that province are prepared to receive the fertilizer in mineral cars. The Kharkovians have constructed excellent agrochemical complexes; the nitrate would not need to lie outdoors there, and therefore, they are quite willing to accept a new approach, suitable for all partners in the agro-industrial complex without exception--the enterprise, agriculture, and Sel'khozkhimiya itself. Wherever there is no base for receiving the nitrate, one speaks of the inconveniences of the new approach. Indeed, bags are more convenient for those who have no warehouses or unloading and loading technology and who do not know how to provide safety. However, if one waits for the slow to move, nothing new will get done. Today, as an exception, the Kharkovians have been permitted to receive nitrate in mineral cars. But the molecules of fertility are also highly necessary in the other Oblasts of the republic. Therefore, the directorate of Ukrsel'khozkhimiya has requested the director of the Severodonetsk production combine "Azot", B. Leshchina, to increase the output of ammonium nitrate. It is not so easy to do this if one considers the fact that for the first two months of the quarter, the production capacities of the enterprise were not fully utilized. So now what--sound the alarm, work harder to catch up? And this at a time when the warehouses of the enterprise are bulging with finished product!

Any emergency is bad, as we know. And we are far from the thought of proposing the use of the new method of transporting mineral fertilizers everywhere. But why not permit mineral cars to be received by those subdivisions of

Ukrsel'khozkhimiya that are ready for them already, today. Well--and the others should obviously be helped. It is good to prepare for a new approach, to envision it in the plans for construction and reconstruction of the subdivisions of Ukrsel'khozkhimiya in the oblasts and rayons.

The old should not interfere with the new and progressive. The tasks of the Severodonetsk Azot, Ukrsel'khozkhimiya, and agriculture in general are the same. And this means that efforts to overcome difficulties should be joint efforts.

The problems of transporting fertilizers, as we have learned, are entirely soluble. Transportation by the old method is unsuited for all partners--production, Ukrsel'khozkhimiya, and agriculture. Therefore, it is high time to switch over from mutual recriminations to joint efforts to overcome the difficulties. The experience of the Kharkovians in this connection is of particular value. We should proceed more energetically in spreading it around; concerning ourselves with the equipment of the warehouses and the use of the means of mechanization which give the "go ahead" signal to mineral freight cars. Agricultural workers await the official solution to the question on which the productivity of the kolkhoz fields largely depends, from the Azot production combine, Ukrsel'khozkhimiya, and the Minsel'khoz [Ministry of Agriculture] of the republic.

"Our task is to make a decisive contribution to putting the national economy on the track of intensive development. We must, are obligated, to arrive at the most advanced scientific and technical positions, a higher world level of productivity of social labor in a short time," was the statement made at the March (1985) Plenum of the CC CPSU. Naturally, this also pertains to the problems we are discussing here.

12822
CSO: 1841/220

CARBAMIDE FERTILIZER PROSPECTS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 6 Apr 85 p 1

[Article by V. Mikhaylichenko, Voroshilovgrad Oblast]

[Text] The workers of the multitonnage carbamide production complex of the Severodonetsk Industrial Combine "Azot" [Nitrogen] are making every effort to overfulfill their quotas for the harvest for the final year of the Five-Year Plan. In the six months that have passed since the complex began operation, 120 thousand tons of concentrated nitrogen fertilizers have been produced. The chemists have significantly advanced the output of "fertility vitamins" [fertilizers].

12822
CSO: 1841/220

UDC 661.635.224.002.237

## PRODUCTION OF COMPLEX CHLORINE-FREE FERTILIZERS WITH MAGNESIUM FOR VEGETABLE GROWING

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 85 pp 26-27

FEDYUSHKIN, B. F., OVCHINNIKOVA, K. N., GRISHAYEV, I. G. and KAZAKOVA, I. V.

[Abstract] A study was performed to develop universal hardware and a technological plan for the production of chlorine-free fertilizers based on evaporated extraction phosphoric acid and ammonium nitrate, using a tubular reactor and drum type ammonizer-granulator, including the stages of preparation of the ammonium nitrate melt, mixing of the melt, potassium sulphate and partially ammonized evaporated extraction phosphoric acid at pH 1.8-2.2 with simultaneous ammonization in the ammonizer-granulator to pH 5.0-5.5, screening and packaging of the finished product. The data obtained confirmed the desirability of using the tubular reactor and ammonizer-granulator apparatus. References 5 (Russian).
[182-6508]

UDC 631.842.4.004.4

## INTRODUCTION OF NEW TECHNOLOGY FOR TRANSPORTATION AND STORAGE OF AMMONIUM NITRATE

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 1, Jan-Feb 85
(manuscript received 17 Aug 84) pp 34-36

ABROSIMOVA, A. M., KUSHNAREVA, V. N., IVAKHNENKO, M. T., LOPATIN, L. V. and MOISEYENKO, A. F., Severodonetsk Production Association 'Azot'.

[Abstract] The Donets railroad was incapable of supplying sufficient numbers of freight cars to carry the ammonium nitrate production of the author's plant, packaged as it was in bags. In the early 1980's, work was performed at the plant to allow bagless production, loading and transportation direct from the plant to the railroad car to a storage facility and to the field. A 60 ton car can be loaded in fifteen to twenty minutes, including two minutes of actual transfer time. The amount of ammonium nitrate loaded in this manner increased from 62,000 tons in 1981 to 101,000 tons in 1982 and 187,000 tons in 1983. The product is of the highest quality category. Figures 4; references 2 (Russian).
[180-6508]

UDC 631.8

# PRODUCTION OF DICALCIUM PHOSPHATE FROM PHOSPHORUS SOLUTIONS FOR FEED USE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 2, Feb 85
(manuscript received 9 Jul 84) pp 225-228

TEPLOV, Yu. A., DMITREVSKIY, B. A., YAROSH, Ye. B., OLIFSON, A. L. and MAKSIMENKO, N. F.

[Abstract] Production of dicalcium phosphate from industrial nitrate for feed use offers a number of advantages, of which the most important is high product yield. Extraction of dicalcium phosphate from extractive phosphoric acid and calcium nitrate is based on ammoniation and detailed knowledge of $CaF_2$ solubility in such solutions at various pH values. As the pH is adjusted from 1 to 2.5 in the presence of 12-16% $P_2O_5$, the solubility of $CaF_2$ decreases, while an increase in the concentration of phosphoric acid in the ammoniated solution at equivalent pH values favors an increase in $CaF_2$ solubility. Studies with several varieties (Khibinsk, Kovdor, Karatau) of apatite and phosphite have demonstrated that ammoniation (20%) reduces phosphorus loss with admixtures approximately two-fold, and results in 92% fluorine removal. The resultant products contained 46.8-51.6% $P_2O_5$ and 0.1-0.2% F, with a $P_2O_5$:F ratio of 260-470. $P_2O_5$ was obtained in 80-85% yields. Figures 3; references 13: 1 Polish, 1 Hungarian, 10 Russian, 1 Western.
[210-12172]

FREE RADICALS

UDC 541.6

# METASTABLE LEVELS OF ORGANIC FREE RADICALS

Tomsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY MV I SSO SSSR FIZIKA in Russian Vol 28, No 3, Mar 85 (manuscript received 6 Feb 84) pp 99-101

OGINETS, V. Ya., Leningrad Shipyards Institute

[Abstract] Absorption spectra were analyzed from 1,3-bis-diphenylene-2-phenylallyl (DPPA), which suggested a quartet level $Q_1$ between 15000 and 19000 $cm^{-1}$, with an assumed metastable state of not less than $10^{-5}$ sec. Analysis of possible energy transfer from DPPA to several cationic dye molecules revealed that only thionine gave evidence of fluorescence in the 620-740 nm region, while rhodamine B and methylene blue failed to do so with excitation provided by 26 nsec neodymium laser pulses at 530 nm. The mean quenching time for thionine luminescence at 77°K was calculated at ca. 8 x $10^{-6}$ sec. The findings were consonant with energy transfer to thionine dimers via an inductive-resonance mechanism from the DPPA radical in the metastable state. Figures 4; references 7: 5 Russian, 2 Western.
[246-12172]

ION EXCHANGE PHENOMENA

UDC 547.94:541,132:677,46/49

# ADSORPTION OF GALANTHAMINE FROM AMMONIATED AQUEOUS SOLUTIONS BY CATION-EXCHANGE FIBERS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 3, Mar 85 (manuscript received 27 Jan 84) pp 624-630

KADYROV, A. Kh., KURBANOV, Sh. A., MUSAYEV, U. N., KHAGI, M. S., ZLOBINA, G. P., VLASOV, A. V. and TSETLIN, B. L.

[Abstract] Kinetic and thermodynamic studies were conducted on the efficiency of various acrylic acid/polypropylene polymer fibers in the extraction of galanthamine from ammoniated aqueous solutions, since such an approach to date has not been utilized. At pH 9.5-9.8 the proposed cation exchange system was found effective in the uptake of galanthamine from the ammoniated solutions, with subsequent elution from the column achieved most efficiently with ammoniated alcohol. Optimum adsorption was attained with cation exchangers containing 50.0-56.5% polyacrylic acid. The respective values for $\Delta F^{\circ}$, $-\Delta H^{\circ}$ and $-\Delta S^{\circ}$ were -1.3, 80.4 and 0.28 kJ/mole at 10°C, -3.1, 80.4 and 0.26 kJ/mole at 20°C, and -4.6, 80.4 and 0.25 kJ/mole at 30°C. At the respective temperatures of 10, 20 and 30°C the maximum cation exchange capacity of the polymer for galanthamine was 0.72, 0.87 and 1.10 mg-eqv/g. Figures 7; references 8 (Russian).
[241-12172]

INORGANIC COMPOUNDS

UDC 546.284-31:543.42

# IR SPECTROSCOPIC STUDY OF DEHYDROXYLATION OF SILICA ALLOYED WITH ALUMINUM OXIDE

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 47, No 1, Jan-Feb 85
(manuscript received 10 Aug 83) pp 146-149

D'YAKONOV, S. S., LYGIN, V. I., SHALUMOV, B. Z., KHLOPOVA, Z. G. and SHIMICHEVA, N. A., Chemistry Faculty, Moscow University; All-Union Scientific Research Institute of Chemical Reagents and High Purity Chemical Substances, Moscow

[Abstract] The authors continue previous studies of dehydroxylation of pure silica and silica alloyed with $TiO_2$ and $GeO_2$, $B_2O_3$, and $ZrO_2$, plus the state of the alloying additives in the silica matrix. A study was made of the state of aluminum atoms in the volume of silica alloyed with aluminum oxide and the kinetics of dehydroxylation of the surface. Silica specimens were studied containing 10, 20, 30, 40 and 50 weight percent aluminum oxide. Specimens were prepared by combined hydrolysis of tetraethoxysilane and aluminum nitrate in an alcohol-water solution with subsequent spontaneous gel formation at room temperature. The kinetics of dehydroxylation of silica alloyed with aluminum oxide were studied in air at 600, 700 and 800 degrees. Comparison of kinetic curves of dehydroxylation of pure and alloyed silica indicates that the rate of dehydroxylation initially decreases in the sequence $SiO_2 \cdot B_2O_3 > SiO_2 \cdot Al_2O_3 - SiO_2 \cdot ZrO_2 > SiO_2 \cdot GeO_2 > SiO_2 \cdot TiO_2 > SiO_2$. The concentration of hydroxyl groups remaining on the surface for a given silica processing temperature is higher for specimens with lower rate of dehydroxylation. Figures 2; references 17: 15 Russian, 2 Western.
[186-6508]

UDC 541.183:678.046

MORPHOLOGY OF BOUNDARY LAYERS OF BINDER IN GRAPHITIZED HIGHLY FILLED BLACK-PITCH COMPOSITIONS

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 47, No 1, Jan-Feb 85
(manuscript received 5 Sep 83) pp 204-207

SMIRNOV, B. N., VARLAKOV, V. P. and FIALKOV, A. S., All-Union Scientific Research Institute of Electrocarbon Products, Elektrougli, Moscow Oblast

[Abstract] Direct electron-microscope studies are performed of the morphology of thin layers of binder in graphitized black-pitch compositions with varying activity of the carbon black particle surface. Compositions were prepared in a blade mixer at 120-125 degrees, rolled at 120-130 degrees, then crushed, screened and the resulting powder was used to press blocks which were then roasted at 1200°C and graphitized at 2800°C. X-ray structural studies of the compositions showed no two-phase structures such as those observed in mechanical mixtures of graphitized black with graphitized pitch coke. The results of the morphologic, microdiffraction and x-ray structural studies indicate that the black has a negative influence on the graphitizing ability of boundary layers of binder adsorbed on its surface, which yield well-graphitized coke when coked in volume. Figure 1; references 7 (Russian). [186-6508]

UDC 620.181.428

CHARACTERISTICS OF GLASS/METAL COATINGS. PART 4. INTERMEDIATE LAYER OF VARIABLE COARSENESS FOR GLASS-METAL FUSIONS

Vilnius TRUDY AKADEMII NAUK LITOVSKOY SSR: SERIYA B KHIMIYA, TEKHNIKA, FIZICHESKAYA GEOGRAFIYA in Russian No 6, Nov-Dec 84
(manuscript received 2 Aug 83) pp 69-75

PAULAVICHUS, R. B. and KONCHYUS, G. A., Institute of Chemistry and Chemical Technology, Lithuanian SSR Academy of Sciences; Vil'nyus State University imeni V. Kapsukas

[Abstract] Technical details are presented on the composition of a metalloceramic composition intended to serve as an intermediate or bonding layer in glass-metal fusions. Using $Na_2O \cdot BaO \cdot 5SiO_2$ or $Na_2O \cdot BeO \cdot 5SiO_2$ glass, the material had the following composition on a weight basis: 82-89% Ni, 4-6% Cr, 0.1-0.6% Si, 0.1-0.6% Fe, 3-5% B, 0.2-0.6% glass, 0.2-0.6% C, and 2-5% clay (bentonite). At low annealing temperatures of 900-950°C a material is formed with a rough metallic phase and suitable for fusions involving low temperature glasses: it contains a diminished concentration of the glass phase on the surface. At higher temperature (950-1100°C) the glass phase component on the surface of the metalloceramic material becomes more prominent and the coarseness of the metallic phase is diminished. Such material is suitable for

fusions with hard glass. These compositions can be anticipated to have broad applications in glass-metal fusions. Figures 1; references 5: 1 Lithuanian, 4 Russian.
[222-12172]

UDC 669.0.18

CHARACTERISTICS OF FIRE RESISTANT CERAMICS IN STREAM OF COMBUSTION PRODUCTS. PART 5. EFFECTS OF HIGH TEMPERATURE GAS STREAM AND MECHANICAL STRESS

Vilnius TRUDY AKADEMII NAUK LITOVSKOY SSR: SERIYA B KHIMIYA, TEKHNIKA, FIZICHESKAYA GEOGRAFIYA in Russian No 6, Nov-Dec 84
(manuscript received 26 Oct 83) pp 102-109

ABRAYTIS, R. Y., BRINKENE, K. V., ZABUKAS, V. K. and MILASHAUSKAS, A. P., Institute of Physicotechnical Problems of Energetics, Lithuanian SSR Academy of Sciences; Kaunas Polytechnical Institute imeni Antanas Snechkus

[Abstract] Studies were conducted on the breakdown of fire resistant ceramic ($Al_2O_3$) balls exposed to high temperature combustion gases and mechanical stress. A hole was drilled through the ceramic samples through which gases resulting from the combustion of propane-butane in oxygen were passed at temperatures ranging from 1200 to 1500°C, while mechanical stress consisted of exposure to compression forces at a rate of 5 N/sec. Up to a temperature of ca. 1350°C brittle breakdown was primarily due to the spread of fissures in the intermediate zone, while at temperatures above 1350°C destruction resulted from fissure development in both the intermediate and spherical zones of the samples. The latter was ascribed to the compression component at the point of contact. An empirical equation was derived to describe the relationship between compression stress and temperature, $\sigma = aT^2 + bT + c$, where $\sigma$ is the contact pressure in MPa, and a, b, and c are constants. Figures 4; references 7 (Russian).
[222-12172]

UDC 661.666.2

EFFECTS OF HYDROCARBON STRUCTURE ON GRAPHITE FORMATION

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 2, Feb 85
(manuscript received 5 Jun 84) pp 389-392

PONOMAREVA, S. K., KOKURIN, A. D., SOLOVEYCHIK, E. Ya. and SMORODINA, T. P.

[Abstract] An evaluation was made of hydrocarbon structure in relation to graphitization, by subjecting anthracene, naphthalene, phenanthrene, fluoranthene and polystyrene to pyrolysis (1270°K, argon atmosphere) and graphitization at 3000°K. X-ray structural analysis demonstrated that only anthracene yielded the crystalline structure of graphite, whereas the other compounds failed to do so. The results of structural analysis are tabulated, including data on interlayer distance, crystallite size, and the ratio of reflection intensities at 112 and 110 ($I_{112}/I_{110}$). Figures 1; references 5: 4 Russian, 1 Western.
[210-12172]

NITROGEN COMPOUNDS

UDC 661.7:557.495.5(047)

# USE, PROPERTIES AND METHODS OF PREPARING BIURET FROM UREA

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 2, Feb 85 pp 99-101

KORYAKIN, A. G., KARLIK, V. M. and ZAGRANICHNIY, V. I.

[Abstract] This is a broad literature survey of the use of biuret as a feed and fertilizer additive and in the production of various organic polymers. References sources for its physico-chemical constants, thermal degradation modes and various synthesis routes are discussed. References 66: 1 Romanian, 16 Russian, 49 Western.
[226-12672]

ORGANOMETALLIC COMPOUNDS

UDC 547.254.7:541.127.3

## THERMAL DECOMPOSITION OF DIPROPYL ZINC

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 28, No 2, Feb 85 (manuscript received 28 Oct 83) pp 30-33

SOKOLOVSKIY, A. Ye. and BAYEV, A. K., Chair of Analytical Chemistry, Belorussian Technologic Institute imeni S. M. Kirov

[Abstract] The kinetic characteristics of thermal decomposition of di-n-propyl zinc (I) and diisopropyl zinc (II) were studied at respective temperature intervals of 443-488 and 358-387°C, in order to formulate an underlying mechanism of reaction. The reaction was accompanied by a 36.4 ± 2.5% pressure increase in the case of I, and a 27.3 ± 2.7% increase in the case of II. The products in both cases consisted of $C_3H_8$ and $C_3H_6$, and of n-$C_6H_{14}$ in the case of I and of 2,3-dimethylbutane in the case of II. Decomposition of both organozinc compounds was accompanied by the formation of gray, metallic zinc crystals. The temperature-dependence of the rate constant for I was expressed by $\lg k = 6.6 \pm 0.2-[(100300 \pm 3200)/(2.3RT)]$. and for II by $\lg k = 9.4 \pm 0.3-[(99600 \pm 5200)/(2.3RT)]$. The fact that the product yields remained virtually identical at all temperatures indicated that temperature had no effect on the mechanism of decomposition. Evaluation of the kinetic data, energies of activation, products and putative reaction pathways indicate that thermal decomposition of I consist of a radical chain reaction, while II is degraded by a simple radical mechanism. References 9: 4 Russian, 5 Western.
[219-12172]

UDC 546.48 + 546.268.6'39

## REACTION OF CADMIUM OXIDE WITH ALCOHOL SOLUTIONS OF AMMONIUM THIOCYANATE

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 51, No 4, Apr 85 (manuscript received 21 Dec 83) pp 342-345

PAVLENKO, V. A., KOKOZEY, V. N. and SKOPENKO, V. V., Kiev State University imeni T. G. Shevchenko

[Abstract] Reactions of cadmium oxide with methanol, ethanol and n-propanol solutions of ammonium thiocyanate were studied along the methods published in

previous papers. The quantity of CdO which could be dissolved in such solutions depended on the solubility of the products and decreased in order: $CH_3OH$, $C_2H_5OH$, n-$C_3H_7OH$. Depending on reaction conditions, various products could be obtained: saturation of alcohol solutions with CdO gave $Cd(NH_3)_2(SCN)_2$, in presence of an excess of CO, heating and stirring, the product was Cd(OH)SCN, with a 1:4 and 1:6 ratio of CdO:$NH_4SCN$--cadmium tetra- and hexathiocyanate complexes were obtained $(NH_4)_{n-2}[Cd(SCN)_n]$. Figures 2; references: 5 (Russian). [249-7813]

ORGANOPHOSPHORUS COMPOUNDS

UDC 661.634.2.68

# CONCENTRATION OF WET-PROCESS PHOSPHORIC ACID FROM KARATAU PHOSPHORITES

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 3, Mar 85 pp 159-160

KHARLAMPOVICH, G. D., KUZNETSOVA, T. L., TERENT'YEV, V. B., KUDRYASHOVA, R. I., GOFMAN, M. S. and BLYAKHER

[Abstract] A scheme is presented for evaporation concentration of wet-process phosphoric acid from Karatau phosphorite, utilizing a column-separation technique. The acid solution was applied to the top of a packed column with a bottom inflow of toluene vapor at 350°C. With the countercurrent flow the phosphoric acid was concentrated by evaporation to a desired concentration, while water vapors and fluoride compounds were discharged from the top of the column at a temperature of 80-90°C. The mixture of vapors from the column were then fed into a percolator filled with alkaline solution at 100°C, yielding a pulp consisting of NaF, $Na_2SF_6$ and NaOH. The water and toluene vapors underwent condensation and separation, with the toluene recycled into the column. The effluent from the bottom of the evaporator column yielded 55-60% $P_2O_5$ at a temperature of 240-250°C. Figures 1; references 9: 7 Russian, 1 Western, 1 unknown.
[230-12172]

PESTICIDES

UDC 547.732+632.952

## SULFUR-CONTAINING HETEROCYCLIC COMPOUNDS AS FUNGICIDES AND INSECTOACARICIDES

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 26, No 1, Jan-Feb 85 (manuscript received 28 Nov 83) pp 103-106

ANISIMOV, A. V., VIKTOROVA, Ye. A., ANDREYEVA, Ye. I. and ROZHKOVA, N. G., Chair of Petrochemistry and Organic Catalysis, Moscow State University; All-Union Scientific Research Institute of Chemical Agents for Protection of Plants

[Abstract] A series of derivatives of thiophene and benzothiophene were synthesized for testing for their fungicidal and insectoacaricidal activities. Tests conducted on a variety of plants, fungi, flies and ticks demonstrated that the congeners of these compounds constitute a promising source of agents with the desired biological properties. Among the most promising agents as fungicides and insectoacaricides are alpha,alpha'-disubstituted thiophenes, containing a halogen, hydroalkylene or alkylthio groups. References 17: 15 Russian, 2 Western.
[211-12172]

UDC 661.52

## TECHNOLOGY OF PRODUCING HIGH QUALITY AMMONIUM SULFAMATE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 85 pp 31-32

ISAKOV, V. I. and ANDREYANOV, V. V.

[Abstract] A technology has been developed and tested for producing high quality ammonium sulfamate, based on neutralization of technical amidosulfuric acid formed upon sulfuration of urea with 65% oleum in a monohydrate medium. The technical 86.1% sulfaminic acid containing 6.7% by weight free sulfuric acid was neutralized with a 25% aqueous solution of ammonia. The neutralization conditions selected provide practically 100% yield of ammonium sulfamate. Filtration of the solutions was used to remove suspended and mechanical impurities. Solutions are evaporated at atmospheric pressure at 100-130°C. Suspensions are contrifuged on a laboratory horizontal filtering centrifuge, then the mother liquors are returned for final filtration to improve the yield. The moist crystalline product after centrifugation contains 93-96% ammonium sulfamate. It is dried by passing hot dry air over the stationary product, then in a fluidized bed. The optimal drying temperature in the fluidized bed was found to be 117-118°C. Figures 2; references 19: 8 Russian, 11 Western.
[182-6508]

PETROLEUM PROCESSING TECHNOLOGY

## EXPLOITATION OF LATEST TECHNOLOGY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 6 Apr 85 p 1

[Text] TASS--The start-up command has been given at the Sovetabad condensed gas deposit in Karakumy, the largest in Central Asia. Yesterday a third installation for preparing the gas for transportation was put on line ahead of schedule. From here the gas will be sent to the Central Asia-Tsentr pipeline. The installation has a capacity of 5 billion cubic meters of fuel annually.

The most advanced experience gained in the exploitation of the gas deposits in Karakumy has been used at Sovetabad. Simultaneously with the installation of the technological equipment at the site, the power lines and water lines were laid, which operate on a fixed schedule. The large block assembly method was widely employed.

12822
CSO: 1841/220

UDC 66.094.187:661.721.4

## KINETICS OF DEHYDROGENATION OF METHANOL ON COPPER-CONTAINING CATALYSTS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 2, Feb 85 pp 76-77

LENDER, Yu. V., KRASNYANSKAYA, A. G., LELEKA, V. E. and NESTERENKO, N. T.

[Abstract] Dehydrogenation of dry methanol to methyl formate was carried out in a nitrogen atmosphere under non-gradient conditions over a Cu-Zn-Al catalyst at 180-280°C. Experimental results indicate that the methyl formate partially dissociates; its net rate of formation is well described by the equation $r=k_1 C_M^{0.85}$ where the logarithm of $k_1$ varies linearly with the reciprocol of temperature. Figures 5; references 5: 3 Russian, 2 Western.
[226-12672]

UDC 546.273:66.095.253.73

## ALKYLATION OF BENZENE BY HIGHER OLEFINS IN PRESENCE OF $BF_3 \cdot Al_2O_3$ CATALYST

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 84, pp 58-60

YAGUBOV, Kh. M., BAKHSHI-ZADE, A. A., SIDOROV, V. A. and MAMEDOV, R. G., All-Union Scientific Research Technologic Institute for Production and Processing of Low Molecular Weight Olefins with Experimental Plant

[Abstract] A study is presented of reaction of alkylation of benzene by higher olefins on the catalytic system $BF_3 \cdot Al_2O_3$. Experiments were performed in a continuous reactor. Benzene and olefin with residual moisture 3-5 ppm were mixed as required and forced into the chamber under dry nitrogen pressure. The chamber was equipped with an exhaust line communicating to the atmosphere through a number of dryers. The initial mixture was fed into the reactor by a volumetric pump. The space velocity of the mixture was determined by the delivery of the pump. Six different olefin fractions were used as alkylating agents. The maximum content of active $BF_3$ mass on the carrier was found to be 16.5%. A portion of it was in the sorbed state on the surface of the catalyst and was wet by the alkylate during the reaction. The conversion of olefin reached 98%, selectivity 96-98%. The time of active operation of the catalyst depends on the content of moisture in the initial mixture. Service life can be increased by maintaining minimum moisture content (3-5 ppm). References 3 (Russian).
[203-6508]

UDC 543 (44+544)

# ALKYLATION OF DIPHENYL BY PROPYLENE IN PRESENCE OF CATALYTIC COMPLEX BASED ON Al WITH $CCl_4$

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 84, pp 54-57

ALIYEVA, A. R., SEIDOV, N. M. and KYAZIMOV, S. M., All-Union Scientific Research Technologic Institute for Production and Processing of Low Molecular Weight Olefins

[Abstract] A study is made of the possibility of alkylation of diphenyl by propylene in the presence of a new catalyst, a catalytic complex of aluminum with $CCl_4$. Alkylation was performed in an autoclave. The mixture of diphenyl and catalyst was placed in the autoclave, heated to the experimental temperature and the calculated quantity of propylene was added. Alkylation of diphenyl by propylene in the presence of the new catalytic system occurs smoothly, the conversion of diphenyl reaching 72-76% with selectivity 86-87%. References 5 (Russian).
[203-6508]

PHARMACOLOGY AND TOXICOLOGY

UDC 661.183.12.004.14:615.273

## ION-EXCHANGERS IN REMOVAL OF PHENOL FROM BIOLOGICAL FLUIDS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 3, Mar 85
(manuscript received 13 Jul 83) pp 581-587

GORCHAKOV, V. D., YELINEK, A. F. and LEYKIN, Yu. A., 2nd Moscow Medical Institute imeni N. I. Pirogov

[Abstract] Several copolymer ion exchangers were tested for their efficiency in removal of phenol from biological fluids (blood, lymph, plasma, cerebrospinal fluid), for suitability for extracorporeal devices. The ion exchangers consisted of modified styrene-divinyl-benzene copolymers, using trimethylamine, tripropylphosphine, ethylenediamine, or tetramethylethylenediamine groups to impart ion-exchange characteristics. Analysis of partition coefficients and absorptive capacities led to the selection of AN-221 (ethylenediamine) as the absorbent of choice for the purification of biological fluids. Subsequent preparation as Hemosorb A-12 (Gemosorb) and studies on hemoperfusion in animal trials showed a lack of any adverse effects and no thrombosis in the filtration columns. Exposure of the blood to Hemosorb A-12 for 60 min had no effect on blood counts, hemoglobin concentration, or the level of hemolysis.
Figures 3; references 14: 11 Russian, 3 Western.
[241-12172]

UDC 541.183.5

## HIGH ADSORPTIVE CAPACITIES OF OXYTETRACYCLINE ON DISPERSED LATTICES ION-EXCHANGERS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 3, Mar 85
(manuscript received 7 May 84) pp 587-591

KOTOVA, N. V., VOROB'YEVA, V. Ya. and SAMSONOV, G. V., Leningrad Chemico-Pharmaceutical Institute

[Abstract] An assessment was conducted on the effects of physical form of polymeric ion-exchangers in terms of their adsorptive capacity for oxytetracycline and the concentration of the ion-exchanger. Measurements conducted at pH 9.0 and 20°C with granular and dispersed latticed forms of the ion-exchanger AV-17-2 demonstrated that in the case of the latter form adsorptive capacity

was concentration-dependent, while such a relationship was not evident with the granular form of AV-17-2. In the case of granular AV-17-2 adsorption of oxytetracycline proceeds exclusively via an ion-exchange mechanism. With latticed AV-17-2 an ion-exchange mechanism was involved at AV-17-2 concentrations of 4-10 mg/ml, whereas at concentrations of 0.1-2 mg/ml both ion-exchange and adsorptive mechanism were in action. Determination of the adsorptive capacities of ion-exchangers 0.1-1.0 and 100-160 μm in size showed greater capacity of the former. Analysis of the thermodynamic parameters of adsorption at 5, 10, 20 and 40°C demonstrated that high selectivity was predicated on the greater entropy values seen at lower concentrations of AV-17-2. The data indicate that AV-17-2 may be used in the isolation of oxytetracycline from culture fluids. Figures 2; references 6 (Russian).
[241-12172]

UDC 615.213:547.58].012.1

## SYNTHESIS AND BIOLOGICAL ACTIVITY OF ARYLAMIDES OF 2-METHYLNICOTINIC AND 2-PHENYLINDOLIZINE-8-CARBOXYLIC ACIDS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 19, No 3, Mar 85 (manuscript received 11 May 83) pp 159-163

SIGOVA, V. I., SEMYAKINA, N. V., ZALESOV, V. S. and KONSHIN, M. Ye., Perm Pharmaceutical Institute

[Abstract] Arylamides of 2-methylnicotinic acid were obtained by reacting ethyl esters of parent acids with arylmagnesium amines. These products, reacted with phenacyl bromides, yielded 1-phenacyl-2-methyl-3-(N-arylcarbamoyl)-pyridinium bromides which, upon refluxing in presence of ammonia, cyclized into arylamides of 2-phenylindolizine-8-carboxylic acids. Physical-chemical properties and IR characteristic bands of these products are reported. The arylamides of 2-methylnicotinic acid exhibited moderate anticonvulsive activity with little toxicity. References 8: 7 Russian, 1 Western.
[240-7813]

UDC 615.281.8:547.551.525.211.1].015.4.07

## SYNTHESIS AND ANTIVIRAL ACTIVITY OF TRANSITION METAL SALTS AND DERIVATIVES OF p-AMINOBENZOLSULFAMIDE

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 19, No 3, Mar 85 (manuscript received 23 May 84) pp 163-165

MIL'GROM, A. Ye., ANDRIANOVA, L. N., PESNYA, O. I., VLADYKO, G. V., KOROBCHENKO, L. V. KARAKO, N. I. and BOREKO, Ye. I., All-Union Scientific Research Institute of Fibers, Kalinin; Belorussian Scientific Research Institute of Epidemiology and Microbiology, Minsk

[Abstract] A series of p-aminobenzenesulfamide salts with $Cr^{3+}$, $Mn^{2+}$, $Fe^{3+}$ and $Ni^{2+}$ was synthesized in which an acetyl group or heterocyclic residue was

attached to the nitrogen atom. Antiviral activity was evaluated against viruses of classical avian plague, Newcastle disease, vesicular stomatitis, Venezuela encephalitis, vaccinia and herpes simplex. The $Cr^{3+}$, $Mn^{2+}$ and $Fe^{3+}$ salts showed no antiviral activity. $Ni^{2+}$ salts possessed variable, weak activity against herpes simplex, classical avial plague and Venezuela encephalitis. References 7: 5 Russian, 2 Western.
[240-7813]

UDC 615.282 + 615.276].012.1

SYNTHESIS AND BIOLOGICAL ACTIVITY OF N-PHENYLANTHRANILIC ACID DERIVATIVES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 19, No 3, Mar 85 (manuscript received 10 May 84) pp 165-168

GAYDUKEVICH, A. N., LEVITIN, Ye. Ya., KRAVCHENKO, A. A., KAZAKOV, G. P., MIKITENKO, Ye. Ye., ARSEN'YEVA, T. I., PINCHUK, V. V., BELETSKAYA, O. V. and ZAKHAROVA, T. I., Khar'kov Pharmaceutical Institute

[Abstract] A series of N-phenylanthranilic acids and their 4-chloro and 4-nitro derivatives was synthesized at 140-150°C in DMFA in presence of potassium carbonate and copper powder as a catalyst. Physical-chemical and IR spectral bands of these products were reported. Several of these products exhibited activity against trichophyton rubrum, trichophyton gypseum and microsporum canis fungi as well as some antiinflammatory effects. References 15: 10 Russian, 5 Western.
[240-7813]

UDC 615.272.4.014.425].017:615.849 1.015.25].012.1

SYNTHESIS AND RADIOPROTECTIVE PROPERTIES OF SOME DIOL LIPIDS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 19, No 3, Mar 85 (manuscript received 15 May 84) pp 168-172

CHECHULINA, L. A., PUCHKOVA, S. M., NOVIKOVA, A. P., BASKAKOVA, Z. M., VYSOKOV, V. I. and AFANAS'YEVA, G. B., Ural Polytechnic Institute imeni S. M. Kirov, Sverdlovsk

[Abstract] Synthesis of O,O-diacylated diols containing residues of 3,4,5-triacetoxy- or 3,4,5-trimethoxybenzoic acid was described and their radioprotective effect was compared to that of diol lipids without antioxidative fragments. Radioprotective activity was studied on C57BL/6 mice. The preparations were injected IP in oil solution. Several compounds exhibited radioprotective activity which was related to the presence of natural antioxidant--gallic acid. References 5: 4 Russian, 1 Western (by Russian authors).
[240-7813]

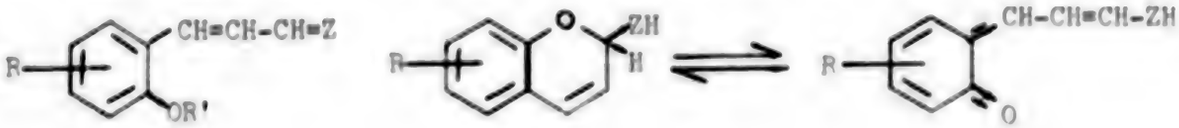
UDC 615.281:547.587.52].015.11

## STRUCTURE AND ANTIMICROBIAL ACTIVITY OF 2-HYDROXYCINNAMIC ALDEHYDE DERIVATIVES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 19, No 3, Mar 85 (manuscript received 29 Apr 84) pp 177-179

ANDREYEVA, I. M., BABESHKO, O. M., BONDARENKO, Ye. M., BARCHAN, I. A., LYASHIK, O. T., MEDYANTSEVA, Ye. A. and SIMKINA, Yu. N., Chemistry Faculty, Rostov-na-Donu University; Scientific Research Institute of Physical and Organic Chemistry, Rostov University

[Abstract] Antimicrobial activity of 2-hydroxycinnamic aldehyde was studied and structure-activity correlations were attempted. The structure of these aldehydes in solution depends on the polarity of the medium, on type of benzannelation and on substituent Z. 2-Hydroxycinnamic aldehyde and its imines exist in benzoid form A; benzannelated systems exist in nonpolar solvents as B and in polar media they are in tautomeric equilibrium B C




"A" "B" "C"

The antimicrobial action of these compounds were shown by A and B forms; C was inactive. The highest activity was exhibited by the parent 2-hydroxycinnamic aldehyde. References 6: 5 Russian, 1 Western.
[240-7813]

UDC 615.453.2/.6.011.17:579.8].014.45:615.849.114

## LOWERING MICROBIAL CONTAMINATION OF FINISHED TABLET AND POWDER DRUGS IN INDUSTRIAL PACKAGING BY $^{60}$Co γ-IRRADIATION

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 19, No 3, Mar 85 (manuscript received 25 Apr 84) pp 223-228

SAFAROV, S. A., SEDOV, V. V., TYRINA, Ye. A. and DEYKINA, L. N., Institute of Biophysics, USSR Ministry of Health, Moscow

[Abstract] The effect of γ-radiation $^{60}$Co on tablet and powder drugs packaged for commercial distribution was examined. Preliminary tests showed that exposure to pasteurization or sterilization levels of radiation did not alter any physical-chemical properties of the test samples, except that some of them changed their color slightly in comparison to controls. Medicinal quality of both tablets and powders was retained. Thus it was shown to be feasible to perform radiation sterilization of sulfanylamide preparations as well as pasturization operations on finished products. References 12: 9 Russian, 3 Western.
[240-7813]

POLYMERS AND POLYMERIZATION

UDC 541.183.5:678-13.026

## ADSORPTION INTERACTION OF TETRAFLUOROETHYLENE PLUS VINYLIDENE FLUORIDE COPOLYMER WITH SOLID SURFACE DURING FORMATION OF ANTIADHESION POLYMER COATINGS

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 47, No 1, Jan-Feb 85
(manuscript received 25 Aug 83) pp 16-22

ZIMON, A. D., VITOVTOVA, G. G., VASIN, A. V., GUSEV, V. V. and GRITSAN, V. N., All-Union Correspondence Institute of the Food Industry, Moscow

[Abstract] Results are presented from studies of adsorption of TFE + VDF copolymer onto the surface of iron oxide $Fe_2O_3$, modeling an oxidized steel surface as a function of the concentration of copolymer in the solution, its molecular weight and the interrelationship of adsorption processes with adhesive strength of the polymer coating. Adsorption was studied from dilute solutions of the copolymer in ethyl acetate, butyl acetate and amyl acetate. It was found that the flexibility of macromolecular chains in the boundary layers is very important in the production of high quality copolymer coatings. The optimal value of flexibility can be obtained by varying the thermodynamic quality of the solvent, concentration of solution and temperature.
Figures 5; references 9: 7 Russian, 2 Western.
[186-6508]

UDC 539.612.(678.675+546.621):546.212

## INFLUENCE OF WATER ON ADHESION INTERACTION OF POLYAMIDES WITH ALUMINUM

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 47, No 1, Jan-Feb 85
(manuscript received 6 Apr 83) pp 93-98

PESETSKIY, S. S., YEGORENKOV, N. I. and SHCHERBAKOV, S. V., Institute of Mechanics of Metal-Polymer Systems, Belorussian SSR Academy of Sciences, Gomel'

[Abstract] This work continues previous studies of the mechanism of the influence of water on the adhesion interaction of aliphatic polyamides with aluminum. The study was performed on adhesion joints between coatings of polyamide 6 and an aluminum foil substrate. Specimens were formed, held in water or aqueous solutions and the adhesion strength and nature of rupture of the joints determined. It is found that the strength of the joints can be varied by changing the corrosiveness of the aqueous solution in which the

coatings are heat treated. The mechanism by which water influences the adhesive interaction of polyamide plus aluminum is discussed. The corrosion of aluminum beneath a polyamide coating should increase under the influence of products of hydrolysis of macromolecules such as amino and dicarboxylic acids, lactams, etc. The lower the content of amide groups in the polyamide, the less its water absorption and tendency to hydrolysis, the higher the molecular weight of the monomers and the lower their diffusion capability. These factors explain the decrease in the effect of increasing adhesion strength in water in the sequence of polyamides P6, P66, P12. Figures 5; references 16 (Russian).
[186-6508]

UDC 539.61:542.943:678.742.2

## INFLUENCE OF TEST TEMPERATURE ON ADHESION TO ALUMINUM OF POLYETHYLENE COATINGS OXIDIZED IN MELTED STATE

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 47, No 1, Jan-Feb 85
(manuscript received 30 May 83) pp 150-152

YEGORENKOV, N. I., RUDINSKIY, I. K. and LIN, D. G., Institute of Mechanics of Metal-Polymer Systems, Belorussian SSR Academy of Sciences, Gomel';
Gomel' University

[Abstract] A study is presented of the adhesion strength of oxidized polyethylene coatings at temperatures from 20 to 140°C. Powdered high-density polyethylene was used with type A-99 aluminum foil after treatment with abrasive paper. Polyethylene powder was placed between two foil specimens to form a foil-polymer-foil specimen at 150°C, pressure 5 MPa, time three minutes. The adhesive strength of nonoxidized and oxidized polyethylene coatings cooled in air decreased monotonically with increasing test temperature up to near the melting point of polyethylene. The influence of test temperature on adhesive strength of oxidized polyethylene coatings cooled in water is more complex than for those cooled in air. A second maximum appears in the 40-70 degree area. Increasing temperature produces a sharp increase in relative elongation of hardened oxidized polyethylene films at 40-50°C. The temperature variation of adhesive strength of oxidized polyethylene coatings cooled at various speeds may thus differ significantly in nature. The maximum of 40-70°C for hardened coatings is related to a relaxation conversion in the polyethylene.
Figures 4; references 9: 8 Russian, 1 Western.
[186-6508]

UDC 667.654.3:678.643.3

## SYNTHESIS OF OXYGEN-CONTAINING DICYCLOPENTADIENE DERIVATIVES AND THEIR USE IN OLIGOMER PREPARATION

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 28, No 2, Feb 85 (manuscript received 15 Nov 83) pp 26-29

OREKHOV, V. N., Chair of Chemical Technology and General Chemistry, Kharkov Institute of Engineering Economics

[Abstract] An analysis was made of the products resulting from liquid-phase oxidation of dicyclopentadiene (I) in p-xylene and triglyceride solution, leading to the identification of monoepoxides, diepoxides and ketones. Comparison of the rates of epoxide formation in p-xylene and in the mixture demonstrated that the presence of 25-30% triglycerides enhances the reaction. The highest concentration of I epoxides, in yields of 49.94 to 60.88%, was obtained in oxidation reactions carried out in the presence of 25-50% triglycerides. Above the 50% triglyceride level, the air flow at 100-110°C is largely used for the oxidation of the triglycerides, leading to a decrease in the yield of epoxides. The resultant derivatives of I were used in the synthesis of oligomers with linseed or sunflower oil, with the final product containing 43.2-48% of the latter. Coating materials prepared from such oligomers, in terms of their hardness and impact and flexural characteristics, are equivalent to the commercial GF-01 product. Figures 1; references 8 (Russian). [219-12172]

UDC 678:743.41-134.678.02

## TERNARY COPOLYMERIZATION OF TETRAFLUOROETHYLENE WITH VINYLIDENE FLUORIDE AND PERFLUOROMETHACRYLIC FLUOROANHYDRIDE

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 28, No 2, Feb 85 (manuscript received 19 Jul 83) pp 80-82

YUSUPBEKOVA, F. Z., ASAMOV and USMANOV, Kh. U., Polymer Chemistry Problems Laboratory, Tashkent State University

[Abstract] An investigation was conducted of the kinetics of ternary copolymerization involving tetrafluoroethylene (I), vinylidene fluoride (II) and perfluoromethacrylic fluoroanhydride (III). Block polymerization was conducted at 298°K with the low temperature catalyst diisopropyl peroxydicarbonate. Analysis of the kinetic plots demonstrated that increasing the concentration of I in the reaction mixture enhanced the reaction rate, while III had a retarding effect due to its relatively lower reactivity. Tabular data are presented on the copolymer yield and rate of polymerization in relation to the duration of polymerization, catalyst concentration (0.5-1.0%), and I:II:III molar ratios. In view of the presence of reactive fluoroanhydride groups in

the copolymers, such ternary polymers lend themselves to various transformations, including those involving crosslinking, without a structural change in the primary backbone chain. Figures 1; references 7: 4 Russian, 3 Western.
[219-12172]

UDC 541.64:547.7

TERNARY COPOLYMERIZATION OF 2-TRICHLOROMETHYL-4-METHYLENE-1,3-DIOXOLANE WITH VINYL MONOMERS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 28, No 2, Feb 85 (manuscript received 18 Aug 83) pp 83-88

KRUGLOVA, V. A., ANNENKOV, V. V., P'YANKOVA, G. S. and KALABINA, A. V., Chair of High Molecular Weight Compounds and Organic Synthesis, Irkutsk State University imeni A. A. Zhdanov

[Abstract] An analysis was conducted on the conditions of radical copolymerization--involving 2-trichloromethyl-4-methylene-1,3-dioxolane, methacrylic (acrylic) acid, and vinylpyrrolidone or vinyl acetate--on the composition, intramolecular structure, inhomogeneity, yield, and relative activities of the individual monomers. Terpolymers were synthesized regardless of the molar ratios of monomers employed. In view of the low reactivity of the dioxolane in radical polymerization reactions, its presence in high concentrations in combination with equimolar concentrations of the other two monomeric components resulted in low yields. In general, the reactivities of the monomers in the ternary system was analogous to their activities in binary systems. The resultant terpolymers were obtained as white powders, soluble in dimethylformamide, alcohols, water:alcohol (4:1) mixtures and neutral phosphate buffer, and insoluble in hydrocarbons and acetone. Figures 4; references 14: 9 Russian, 5 Western.
[219-12172]

UDC 541.64:539.3

EFFECTS OF ANTIOXIDANTS ON MECHANICAL CHARACTERISTICS OF POLYETHYLENE TEREPHTHALATE FIBERS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 28, No 2, Feb 85 (manuscript received 29 Mar 83) pp 89-93

PROKOPCHUK, N. R., MATUSEVICH, Yu. I., KRUL', L. P. and POLIKARPOV, A. P., Scientific Research Institute of Physicochemical Problems, Belorussian State University imeni V. I. Lenin; Institute of Physicoorganic Chemistry, Belorussian SSR Academy of Sciences

[Abstract] The mechanical properties of polyethylene terephthalate (PT) fibers were studied in relation to incorporated antioxidants and thermooxidative effects. The studies were conducted with PT fibers doped with the antioxidants

4-(4'-phenylazophenylamino)-5-methoxy-1,2-benzoquinone (I) or phosphorous acid (PA). Analysis of deformability and tenacity characteristics of treated fibers in relation to the effects of the antioxidants on the energies of activation for destructive processes demonstrated that I is superior to PA. In the case of PT melts, replacement of PA by I increases the energy of activation for thermooxidative destruction by 17 kJ/mole. Furthermore, in the case of isotropic PT fibers, use of I rather than PA reduced the energy of intermolecular interaction by 27 kJ/mole, while having no special effect in the case of the melts. Consequently, the interplay of these two energy factors--depending on the antioxidant used--determines the effects of antioxidants on the tensile strength and other mechanical characteristics of PT fibers. Figures 2; references 15 (Russian).
[219-12172]

UDC 678.674.664

## EFFECTS OF AMINOANTHRAQUINONES ON FLAMMABILITY OF POLYURETHANE FOAMS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 28, No 2, Feb 85 (manuscript received 18 Oct 83) pp 94-97

MASLOSH, V. Z. and POPENKO, G. V., Rubezhnoye Branch, Voroshilovgrad Machine Construction Institute

[Abstract] A variety of bifunctional aminoanthraquinones were tested for their effects on the flammability of polyurethane foams. Methods of introduction of the aminoanthraquinones into the polyurethane molecule had a profound effect on the fire-retarding effects, with maximal decrease in flammability obtained when the retardant was linked chemically to the oligomer. In terms of effectiveness, the aminoanthraquinones ranked as follows: 1-amino-4-hydroxyanthraquinone < 1,5-diaminoanthraquinone < 1,4-diaminoanthraquinone-< 1,4-diamino-2-methoxyanthraquinone < 1,5-dihydroxy-2-bromo-4,8-diaminoanthraquinone. Figures 1; references 4 (Russian).
[219-12172]

UDC [678.675'126-278]:[628.513+542.67+628.511.4]

## MICROPORE CAPRON MEMBRANES IN BIOMEDICAL STERILIZATION

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 39, No 4, Apr 85 (manuscript received 5 Jul 84) pp 344-347

ARKATOV, Yu. M., VIL'NER, B. Ya., KORSHUNOVA, T. A., ARTAMONOV, V. A. and SOLDATOV, V. S., academician, Belorussian SSR Academy of Sciences, Institute of Physiology, Belorussian SSR Academy of Sciences; Institute of Physicoorganic Chemistry, Belorussian SSR Academy of Sciences

[Abstract] Extensive testing studies were conducted on micropore (0.22 and 0.1 μ) capron membranes to assess their suitability for the sterilization of

various biological fluids (culture media for bacteria and cell lines, serum, pharmaceutical preparations, etc.). Various forms of sterilization, using both autoclaves and gases, had no significant effect on the membranes as far as pore size and mechanical characteristics were concerned. In addition, trials with various cell lines showed that the capron membranes were devoid of any cytotoxic effects on the cells. In summary, the membranes were found suitable for filter sterilization of a variety of biological fluids, with exclusion of microorganisms 0.22 μ in size. Figures 2; references 2 (Russian). [229-12172]

UDC 661.718.5.004.82

## CONVERSION OF SIDE PRODUCTS OF SYNTHESIS OF METHYLDIPHENYLSILANE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 2, Feb 85 pp 81-83

DUNAYEVA, L. V., ROGACHEVSKIY, V. L., FURSA, O. N., ZHARKOVA, N. M., SOKOLOV, N. M. and ZHUN', V. I.

[Abstract] The major side product of the referenced synthesis is methyltriphenylsilane (up to 20%), along with methylphenylsiloxane and some unidentified components. This residue was treated with an electrophilic reagent, generally HCl, which forms chlorosilanes, particularly methyldiphenylchlorosilane, and benzene. Experiments at 120-200°C gave up to a 50% yield from methyltriphenylsilane with a 6.5 h reaction time. A ferrous chloride catalyst (3.5-5%) allowed reduction of both time and temperature and converted up to 93% of the methyltriphenylsilane. Figures 2; references 4: 3 Russian, 1 Western. [226-12672]

UDC 678.742.2:620.18

## THERMOCHEMICALLY CROSS-LINKED MATERIALS BASED ON LOW PRESSURE POLYETHYLENE

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 1, Jan-Feb 85 (manuscript received 14 Aug 84) pp 37-39

MYSHKO, V. I. and SINEL'SHCHIKOV, Ye. I., Department of Petrochemistry, Institute of Physical and Organic Chemistry and Coal Chemistry, Ukrainian SSR Academy of Sciences.

[Abstract] A study was made of the problem of diffusion introduction of dicumyl peroxide during heat treatment of type 21006-075 and type 203-07 black 902 low pressure polyethylene after shaping of products in the form of pipes with outside diameter 4-10 mm, wall thickness 0.5-0.6 mm. The peroxide was applied from a 20% acetone solution containing 3-5% polybutyl methacrylate to prevent sloughing of the peroxide from the surface of the polyethylene film. Polyethylene films were formed from granules. The cross-linking conditions were selected so as to avoid deformation of the pipe during heat treatment. The studies showed that cross-linking of products without loss of shape can be performed to a depth of 250-500 μm by rapidly increasing the temperature to support

intensive cross-linking in the surface layers whereas the underlying layers do not reach the flow point. Some of the peroxide is lost by evaporation and induced melting. Since the diffusion of peroxide occurs under essentially nonequilibrium conditions with variable boundary concentration of peroxide and a polymer structure which changes during diffusion, the distribution of the cross-linked polymer and density of cross-linking have a gradient in the direction perpendicular to the surface of the product. Figures 2; references 5 (Russian).
[180-6508]

UDC 678.004.12:548.73

SPECIFICS OF STRUCTURAL ORGANIZATION OF POLYPROPYLENE FILMS AS A FUNCTION OF FORMATION CONDITIONS

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 1, Jan-Feb 85 pp 43-46

KUCHINKA, M. Yu.

[Abstract] A study is made of the influence of formation conditions (transverse and longitudinal gradients of temperature, longitudinal speed gradient) on the structural organization of isotactic polypropylene films. Film specimens were formed by flat slit extrusion from domestic isotactic polypropylene with melt index 3 g/10 min, isotactic fraction 93%. Cooling was by water bath, water temperature varying from 20-65°C with all other temperatures remaining constant. The structure was studied by optical microscopy, low-angle light scattering, and scattering of x-rays at high and low angles. It was found that the major reason for formation of differences in the nature, dimensions and orientation of structural elements through the transverse cross section of the films is the transverse temperature gradient. Considering the high speed of crystallization of the films, it is assumed that by changing the angle of entry of the jet of melt into the cooling water bath it would be possible to produce film structures asymmetrical relative to their axes. Changes in the entry angle would most influence the temperature gradient on the two surfaces of the film. A greater temperature gradient corresponds to a broader surface zone. Changing the angle of entry from 90° to 45° results in significant asymmetry of formed structures, manifested as displacement of the central layer toward the surface with the lower temperature gradient. Figures 3; references 9: 6 Russian, 3 Western.
[180-6508]

UDC 678.01:541.1

## INHOMOGENOUS MELTS OF THERMODYNAMICALLY COMPATIBLE POLYMERS: PA-6/PA-54 SYSTEM

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 53, No 3, Mar 85
(manuscript received 13 Jan 84) pp 321-324

SUPRUN, N. P., ANOKHIN, V. V. and ROMANKEVICH, O. V., Kiev Technologic Institute of Light Industry

[Abstract] Various methods of mixing of two thermodynamically compatible polymers--polycaproamide (PA-6) and polyamide (PA-54)--were studied for their effects on the melting temperature of the resultant melts and their structural features. The fact that the method of mixing affected the degree of mutual solubility was indicated by several peaks on the melting temperature plots that were intermediate to the melting temperatures of the parent polymers, microviscosimetric data, and reflected light microscopy. These observations emphasize the significance of the method of mixing of thermodynamically compatible polymers on the final product. Figures 3; references 21: 16 Russian, 5 Western.
[218-12172]

UDC 541.124

## METHACRYLIC ACID/TERTIARY AMINE IONIC COMPLEXES

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 53, No 3, Mar 85
(manuscript received 9 Aug 83) pp 325-328

MASLYUK, A. F., KHRANOVSKIY, V. A., BOYKO, V. P., BEREZNITSKIY, G. K. and GRISHCHENKO, V. K., Institute of the Chemistry of High Molecular Weight Compounds, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] IR spectra were analyzed for the ionic complexes formed between methacrylic acid and triethylamine or beta-diethylaminoethanol for structural and compositional information. The salt (ionic) complexes were formed via a mechanism involving protonation of the tertiary nitrogen in the amines with methacrylic acid proton. The ionic complexes represented, in effect, ion pairs with molecules of methacrylic acid associated with the anion. Figures 3; references 8: 5 Russian, 3 Western.
[218-12172]

UDC 678.746.522:771.543.13

## GLYCIDYLCARBAZOLE BLOCK CO-OLIGOMERS WITH SUBSTITUTED EPOXIDES

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 53, No 3, Mar 85
(manuscript received 11 Nov 83) pp 328-330

GETMANCHUK, Yu. P., SAZONENKO, V. V. and BLAZHKO, Ye. V., Kiev State University imeni T. G. Shevchenko

[Abstract] Studies were conducted on the preparation of block copolymers by cationic copolymerization of glycidylcarbazone with epichlorohydrin and the glycidyl ester of disproportionated rosin at 80°C in toluene. Polymerization was initiated by boron trifluoride etherate. Two basic types of block copolymers could be synthesized by this approach, by polymerizing one of the monomers in the presence of an oligomer of the other. The block copolymers were isolated by reprecipitation from the toluene solution by methanol in 70-85% yields. All of the prepared oligomeric samples showed enrichment in glycidylcarbazole, indicating the greater activity of this monomer in exchange linkage. The resultant block copolymers were observed to be photosensitive, with sensitivity ranges of $4.4 \times 10^{-7}$ to $4 \times 10^{-6}$ J/cm$^3$. References 5 (Russian).
[218-12172]

UDC 661.193:123.3

## SYNTHESIS AND APPLICATION OF WATER-SOLUBLE AMMONIUM POLYMERS PREPARED FROM EPICHLOROHYDRIN AND POLYAMINES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 2, Feb 85
(manuscript received 1 Jun 83) pp 419-421

YEDGAROV, N. N., DZHALILOV, A. T. and VIKSEL'MAN, I. M., Tashkent Polytechnic Institute

[Abstract] Studies were conducted on the synthesis of water-soluble cationic polyelectrolytes, containing ionogenic ammonium groups, via the reaction of epichlorohydrin with polyamines in polar solvents. Studies over a wide, low-temperature range demonstrated that at 20-70°C highest yields and viscosities of the polymers were obtained with equimolar concentrations of the reactants. The rate of polymerization was increased in aqueous and organic solvents in proportion to an increase in the dielectric constant. The latter phenomenon was apparently due to dissociation of the strongly polar groups of the monomer and the growing chain. Use of the polymers as flocculants in tungsten slurries resulted in 92.3% tungsten recovery, as opposed to 83.6% recovery with other flocculants. References 4 (Russian).
[210-12172]

UDC 678.2:539.4

MECHANICS OF SYNTHESIS OF NOVEL COMPOSITE MATERIALS

Kiev VISNYK AKADEMIYI NAUK UKRAYINS'KOYI RSR in Ukrainian No 3, Mar 85 pp 3-10

VANIN, G. A., doctor of technical sciences

[Abstract] A discussion is presented of the theoretical aspects underlying the mechanics of various composites, representing as they do combinations of two or more materials in separate phases designed to form structures that take advantage of selected desirable properties of each component. The constituents can be synthetic or natural materials in the form of plates, filaments, foams, rods, fibers, etc. The latitude of these variables provides additional opportunity for optimization than can be achieved with homogenous materials. Coverage is also accorded to the variable roles of matrix and reinforcement, prediction of composite properties, and mechanical performance under stress. Figures 8; references 9: 7 Russian, 2 Western.
[239-12172]

UDC 547.71

EPOXYHETEROCYCLIC COMPOUNDS FOR POLYMERIC MATERIALS

Kiev VISNYK AKADEMIYI NAUK UKRAYINS'KOYI RSR in Ukrainian No 3, Mar 85 pp 20-27

SHVAYKA, O. P., KOROTKYKH, M. I. and ARTEMOV, V. M.

[Abstract] A brief overview is presented of the chemistry and potential uses of epoxyheterocyclic compounds for the synthesis of novel polymeric materials. Basically, the epoxyheterocycles or heteryloxiranes are compounds that contain, in addition to the oxirane ring, one or more other heterocyclic rings. The chemical behavior of these compounds differs markedly from that of their aromatic and aliphatic analogs due to the combination of a heterocyclic ring and an epoxide group in the same structure. Their unique chemical construction endows them with such interesting properties as the capacity for forming complexes, low flammability, semiconductor characteristics, etc. The vast majority of the epoxide polymers having a practical importance fall into four categories: azino-, azolo-, oxolo- and oxanooxiranes. Although epoxyheterocyclic polymers have been around since the fifties, it appears that their major development and importance is yet to come. Already they have been identified in many cases to possess bioactivity, one of the more important of which is antineoplastic. References 43: 2 Polish, 14 Russian, 27 Western.
[239-12172]

UDC 678.742.3:66.095.262

## SPECIFICS OF POLYMERIZATION OF PROPYLENE ON ZIEGLER-NATTA CATALYST IN PRELIMINARY CATALYTIC PURIFICATION OF MONOMER

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 85 pp 6-8

VOLOSHIN, I. A., KASHIRINA, G. N., KRAVCHENKO, T. V. and SHESTAK, Yu. N.

[Abstract] Preliminary polymerization with Ziegler-Natta catalyst in polymerization of propylene can significantly alter the technological parameters of the process and properties of the polypropylene in a favorable direction. Analysis of the literature indicates the effectiveness of prepolymerization of propylene. This article studies the advantages of prepolymerization of propylene on a titanium trichloride-diethyl aluminum chloride system. Pretreatment of the catalyst with propylene decreases the solubility of the $TiCl_3$ in the stage of polymerization by a factor of 1.5 to 2.0, facilitates mixing of the suspension of $TiCl_3$ by decreasing its density and facilitates its breakup in the circulating loop. The polypropylene produced on catalyst pretreated with the monomer is equal in properties to the standard product. Changing temperature, pressure and time of pretreatment of the catalyst with propylene, with or without a modifier, can increase the isotactic index, bulk density and impact toughness of the polypropylene. Figure 1; references 13: 4 Russian, 9 Western.
[207-6508]

UDC 678.746.222-139.01:539.411.5:621.56

## ESTIMATE OF RESISTANCE OF IMPACT-RESISTANT POLYSTYRENE TO FREON

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 85 pp 13-14

VUL'F, M. A., SHLYAKHOVA, T. G., POLONSKIY, V. S. and NIKITIN, Yu. V.

[Abstract] A convenient method has been developed for determining the freon resistance of impact-resistant polystyrene and indices are calculated which represent the resistance of this polymer to cracking in a medium of freon. The method involves physical-mechanical testing of standard polystyrene specimens before and after exposure to freon-11 vapor in an installation which can be used under both laboratory and production conditions. The stability factor of relative elongation at rupture is used as the main indicator characterizing the resistance of polystyrene plates to the effects of freon vapors. Tests have shown that cast specimens are not suitable for evaluation of the freon resistance of the materials due to the presence of a strongly oriented surface layer which prevents penetration of the freon vapor into the specimen. Pressed or extruded specimens are more suitable. Figures 2; references 8: 3 Russian, 5 Western.
[207-6508]

UDC 678.643'42'5.01:536

## THERMOPHYSICAL PROPERTIES OF MODIFIED EPOXY COMPOSITIONS

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 85, pp 14-16

SHUT, N. I., SICHKAR', T. G., CHERNIN, I. Z., BESEDINA, M. N. and DUSHCHENKO, V. P.

[Abstract] In order to study the possibility of using an epoxy ether with one terminal epoxy group as binder in the preparation of adhesives, multilayer plastics and other purposes, the heat thermophysical and other characteristics of cured epoxy compositions were determined. Commercial epoxy diane resin type Ed-20 was modified with epoxy ether containing 3.4% epoxy groups and 4.2% hydroxyl groups. The influence of the modifier on the thermal stability, thermal conductivity, density, dynamic elasticity modulus in shear and mechanical loss angle tangent of the epoxy compositions was studied. Introduction of the reactive epoxy ether oligomer to the epoxy polymer in the stage of chemical formation was found to allow regulation of its thermophysical and mechanical properties over broad limits. Figures 3; references 9 (Russian). [207-6508]

UDC 678.743.4:532.72:661.876.21

## DIFFUSION AND PROTECTIVE PROPERTIES OF FLUORINE-CONTAINING POLYMERS IN CHROMIC ACID

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 85 pp 16-18

LOBANOV, YU. Ye., SHTERENZON, A. L., KOPYLOVA, L. I., and SHISHKINA, Z. I.

[Abstract] A study was made of the possibility of using fluoropolymers as protective coatings on metals before use in chromic acid media. A copolymer of vinylidene fluoride and hexafluorylpropylene (F-26) and polyvinylfluoride (F-2M) were used. The increase in mass of specimens in chromic acid is directly proportional to the depth of penetration of the acid into the polymer. Interaction of chromic acid with the polymer has practically no influence on its physical-mechanical properties. However, rapid diffusion of the acid through the polymer to the surface of the metal or adhesive joint may make the substances tested unsuitable as protective coatings. Penetration of acid to the adhesive layer is accompanied by disruption of the bond between coating and substrate. The calculated service life for a F-2M lining in 500 g/l $CrO_3$, coating thickness 1mm, is 18 years at room temperature. Figures 2; references 5: 3 Russian, 2 Western.
[207-6508]

UDC 678.62:621.315.616

## PHENOL-ACETALDEHYDE RESINS AND THEIR PROPERTIES

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 85 pp 18-19

GUTSALYUK, V. G., SAFRONOVA, A. S., PAK, I. V., VASIL'YANOVA, L. S., CHERTKOV, N. S. and KOZAKOV, L. M.

[Abstract] Optimal conditions were determined for producing phenol-acetaldehyde resins with minimum waste and power consumption. Phenol-acetaldehyde oligomers were produced at various temperatures, reaction times, catalyst concentration and in various solvents to study the influence of synthesis conditions on isomer composition of the reaction products. The reaction of synthesis of novolak phenol-acetaldehyde resins should be performed in a melt with a phenol:aldehyde ratio of 1:1 by weight, hydrochloric acid concentration 0.0045-0.018 mol per mol phenol, and temperature, 60-70°C. The same equipment intended for synthesis of phenol-formaldehyde resins can be used. The use of concentrated aldehyde reduces power consumption by a factor of 1.6, waste water production by a factor of 4-5. References 4 (Russian).
[207-6508]

UDC 678.032.2.541.24.08

## PROPERTIES OF BUTADIENE METHYLSTYRENE BLOCK COPOLYMERS WITH STAR STRUCTURE

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 85 pp 20-21

POLYAKOVA, G. R., GRIGOR'YEVA, L. A., GLUKHOVSKIY, V. S., BALASHOVA, N. I., IZYUMNIKOV, A. L. and POLYAKOV, D. K.

[Abstract] Butadiene-a-methylstyrene block copolymers with star structure produced by periodic synthesis on a pilot-scale installation with a capacity of 16 cubic meters were studied. According to the data obtained with a fixed content of 1 fragment it is possible to estimate the influence of the second fragment on the strength characteristics of a three-component polymer system. All of the specimens studied were trimodal, the growing ends of the chains being broken in the second and third stages of synthesis. The variation in strength of three component block copolymers as a function of composition has an extreme. Addition of a diblock copolymer with no strength of its own may significantly increase the strength of the product. Figure 1; references 3 (Russian).
[207-6508]

UDC 678.675.002.612.3.01

## INFLUENCE OF COMPATIBILITY PARAMETER ON PROPERTIES OF BINARY POLYHEXAMETHYLENE ADIPINAMIDE-BASED BINARY MIXTURES

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 85, pp 21-22

LAPSHIN, V. V., ANDREYEVA, T. I., VAKHTINSKAYA, T. N., SOLOV'YEVA, I. I. and TRIFONOVA, L. V.

[Abstract] A study is made of the influence of chemical structure and, particularly, β polymers on technological and mechanical properties, warping, anisotropy of mechanical properties and shrinkage of cast specimens of binary mixtures based on polyhexamethylene-adipinamide (PA-66). A cast plate specimen measuring 110 x 110 x 2 mm with a slot runner over the entire length of the plate was used, allowing the properties of the material to be evaluated in the direction of filling of the casting mold, at an angle of 45° and perpendicular to it. Decreasing the β components in the binary mixture was found to facilitate a decrease in anisotropy of mechanical properties and shrinkage, warping of cast products, to increase the work of rupture upon impact, relative elongation in tensile testing and yield limit in extension. A decrease in molecular mass of the polymer filler improved the technological and mechanical properties of the mixture, but their variation as a function of β did not change. The most promising polymer fillers for PA-66 are PA-6, PA-610, and PA-12, polymers similar in chemical structure to the polymer matrix. References 4: 3 Russian, 1 Western.
[207-6508]

UDC 678.5:66.047.76:678.016

## SERVICE CHARACTERISTICS OF FIBER COMPOSITE MATERIAL PRODUCTS

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 85 pp 22-25

TELESHOV, V. A. and MOTAVKIN, A. V.

[Abstract] Results are presented from studies of the usage characteristics of products made of fiber composite materials based on thermosetting polymer matrices with chaotically distributed discrete glass fibers. The influence of recipe factors on the basic usage characteristics such as tensile strength, flexural strength, impact toughness, modulus of elasticity of extension and relative elongation at failure was studied. The results show that the strength characteristics of composite materials correlate with relative elongation at rupture ε. The highest strength characteristics are provided by phenol-formaldehyde and epoxy-phenol binders with VMP glass fiber, the lowest with organosilicon KA-812 binder, the most brittle of all of the polymer binders studied. The influence of usage temperature on servi e life of products can be satisfactorily described by the use of the Larson-Miller-Goldfein parameter. Figures 2; references 9: 6 Russian, 3 Western.
[207-6508]

UDC 678.5.067.5.016

## GLASS FILLED COMPOSITE MATERIAL WITH LONG SERVICE LIFE

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 85 pp 27-29

KRUPENINA, L. A.

[Abstract] The mechanical and dielectric properties of glass reinforced plastics exposed to corrosive media depend significantly on the physical and chemical processes occurring at the glass-resin interface. In terms of duration of exposure and combination of mechanical properties, the most promising of these materials are type DSV glass-filled pressed materials, particularly DSV -2R-2M based on modified resol resin type LBS-20. Replacement of BS-10-84 glass fiber with BS-10-84-76 fiber yields material type DSV-2R-2M-76. Specimens of this material were prepared and tested both as delivered and after exposure to various climatic factors. Properties of the new type of press material are somewhat better as delivered than that of DSV material. The properties of the material are quite stable upon twelve months storage in heated or unheated warehouses, a result of the improved bond strength of the glass-resin interface and high strength of the composite material. The reduction in strength observed upon exposure to organic solvents is less than that in standard DSV material. The predicted service life of products of the new press material should be up to 25 years, with superior initial properties. Figure 1.
[207-6508]

UDC 678.01:620.163.4

## DEFORMATION-STRENGTH PROPERTIES OF THERMALLY STABLE POLYMERS

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 85 pp 32-33

MIKHITAYEV, A. K., KOZLOV, G. V. and SHOGENOV, V. N.

[Abstract] The modulus of elasticity of polymers in extension is determined by the flexibility of the macromolecules, a function of temperature and time (parameter I), intensity of intermolecular interaction (parameter II) and chemical bond angle (parameter III), though this third parameter is considered negligible at temperatures much higher than 0°K. A study is made of the peculiarity of behavior of rigid chain polymers in failure manifested as spontaneous attenuation of major cracks. This phenomenon is not related to macroscopic plasticity of the polymer, occurring in the most brittle of tested films. It is determined only by the capability of the polymer for local plastic deformation. The specifics of the mechanics of linear thermally stable polymers are related to the specifics of processes of deformation at failure, shear deformation determining the plasticity of rigid-chain polymers. The results of studies of these processes should be considered in developing high-strength, thermally-stable polymers and polymer materials with optimal mechanical properties. Figures 2; references 16: 8 Russian, 8 Western.
[207-6508]

UDC 678.5.073.027.3

## PROPERTIES OF THERMOPLASTICS SUBJECTED TO SOLID PHASE HYDROEXTRUSION

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 85 pp 34-35

MYASNIKOV, G. D. and TSYGANKOV, S. A.

[Abstract] Hydrostatic extrusion of polyolefins and other thermoplastics was performed at a temperature 20-70°C below the melting point of the crystalline polymers and 10-30°C below the glass point of the amorphous polymers at 5-250 MPa, matrix angle 20-120°. The rate of extrusion at which straight bars with good surface quality was obtained was $1.7\text{-}3.5 \cdot 10^{-3}$ M/S for all materials. A sharp increase in transparency was observed in polyolefins as in fluoroplastics with increasing extrusion drawing factor up to a value of 4. The elastic and strength characteristics of the fluoropolymers in the direction of extrusion are increased by 1.2-3.5 times. Production of pipes by solid phase extrusion succeeded in producing biaxially oriented products with predetermined properties in the axial, tangential and radial directions. Figures 3; references 2 (Russian).
[207-6508]

UDC 678.5.027:54-11

## SHAPING OF POLYMERS IN SOLID STATE

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 85, pp 35-37

POKROVSKIY, Ye. M.

[Abstract] The shaping of polymers in the solid state using primarily methods traditionally used in forming of metals is performed on such standard metal working equipment as hydraulic presses. Introduction of this complex of methods has been hindered by the unavailability of data on the mechanical properties of the materials when worked under pressure. During plastic deformation of polycrystalline bodies such as thermoplastics their structure is changed, accompanied by development of texture which increases the values of mechanical characteristics as well as their anisotropy. Testing of specimens 20 mm in diameter and height was used to determine the capability of polymer materials for great plastic deformation. Multistep regression analysis of the results for low pressure polyethylene and polypropylene has produced regression equations with determination coefficients of about 90% for polyethylene, 72% for polypropylene. The study of the possibility of working thermoplastics in the solid state has shown the capability of these materials for high plastic deformation and the possibility in principle of closed impression dye forging, extrusion and multiple-cavity stamping of these materials in the solid state. References 9: 6 Russian, 3 Western.
[207-6508]

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UDC 678.742.046:539

# PROPERTIES AND STRUCTURE OF FILLED POLYOLEFIN COMPOSITES

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 85, pp 37-39

VARKALIS, A. Yu., BRANTS, I. P., YAUNROMANS, I. I., METRA, A. Ya.

[Abstract] Results are presented from a study of the diffusion, sorpiton and structural characteristics of filled polyolefins with various contents of dispersed phase, as well as the influence of fillers on the structure of amorphous and crystalline polymer matrices. The study was performed on filled high-pressure polyethylene based composites, copolymers of ethylene with vinyl acetate containing 6.6 and 28.9% vinyl acetate and a copolymer of ethylene with propylene containing 60% propylene. Adhesion-active fillers were used to increase the adhesive strength of the bonds between polyolefin and metal. The experimentally determined density of the composites was found to be less than the calculated density. By using fillers with various specific surfaces, it is possible to regulate the structure of the composites as desired, producing protective coatings of polyolefins with predetermined properties. Figures 2; references 10: 8 Russian, 2 Western (1 by Russian authors).
[207-6508]

RADIATION CHEMISTRY

UDC 66.067.38.621.039

## NUCLEAR ULTRAFILTERS

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 47, No 1, Jan-Feb 85
(manuscript received 8 Aug 83) pp 3-8

APEL', P. Yu., KUZNETSOV, V. I., ZHITARYUK, N. I. and ORELOVICH, O. L.,
Joint Institute of Nuclear Research, Dubna

[Abstract] A study is reported of the etching of microscopic pores in polyethylene terephthalate films bombarded with xenon ions. Specimens of the films 5 and 10 μm thick were bombarded with $^{132}Xe$ and $^{136}Xe$ ions with an energy of about 1 MeV/ion on a cyclotron. The bombarded films were stored in air and exposed to UV light before etching. The conductometric method was used to study the change in pore diameter during etching of the bombarded films. Electron microscope studies revealed effective pore diameters of 150 to 900 Å with diameter variations of about 15% for the smallest pores, less for larger ones. Figures 3; references 17: 9 Russian, 8 Western.
[186-6508]

UDC 678.742.2:66.029

## STUDY OF INFLUENCE OF 4,5-DIMETHOXY-1,2-BENZOQUINONE ON RADIATION MODIFICATION OF POLYETHYLENE

Minsk VESTSI AKADEMII NAVUK BSSR in Russian No 1, Jan 85
(manuscript received 9 Dec 83) pp 103-106

RYASNOY, V. D. and KRUL', L. P., Scientific Research Institute of Physical-Chemical Problems, Belorussian State University imeni V. I. Lenin

[Abstract] A study is reported of the influence of 4,5-dimethoxy-1,2-benzoquinone (DMBQ) used in a new method of thermal stabilization of products of polyolefins on radiation modification of polyethylene (PE). It is suggested that radiation mocification of PE compositions results in the formation of radicals in the DMBQ according to a mechanism which is diagrammed. The radicals can interact with the polymer macroradical forming stable products. The inhibiting influence of DMBQ on thermal oxidation also consists of the capability of its three radicals to interact with $RC_2$ and form stable products. Figures 2; references 6 (Russian).
[187-6508]

UDC 678.742.2:66.029

## SPECIFICS OF RADIATION-CHEMICAL CROSS LINKING OF STABILIZED POLYETHYLENE IN AIR

Minsk VESTSI AKADEMII NAVUK BSSR in Russian No 1, Jan 85
(manuscript received 23 Nov 83) pp 106-110

KRUL', L. P., MATUSEVICH, Yu. I., ZUBETS, O. V., KONDRATOVICH, Ye. I., and PETRYAYEV, Ye. P., Scientific Research Institute of Physical-Chemical Problems, Belorussian State University imeni V. I. Lenin

[Abstract] A study is reported of the influence of the addition of 4,5-dimethoxy-1,2-benzoquinone (DMBQ) on the radiation-chemical cross linking and oxidation of PE in air upon exposure to ionizing radiation. The density of transverse cross linking in irradiated PE was judged from the magnitude of the gel fraction, determined as the ratio of the weight of the specimen, washed for twenty-five hours in boiling toluene and dried in air, to the weight of the unwashed specimen. It was found the introduction of DMBQ to PE at 2-3 wt. percent inhibits the process of radiation-chemical oxidation of the polymer upon exposure to ionizing radiation, leading to an increase in the cross linking density. This is particularly true of products with a thickness of the order of 200 μm. The mechanical properties of stabilized PE, as well as RPE, deteriorate with increasing DMBQ content in the polymer, probably a result of the decrease in intermolecular interaction energy in the system due to the steric factor. Figures 3; references 8 (Russian).
[187-6508]

UDC 541.15

## RADIOLYSIS OF AQUEOUS SOLUTIONS OF OXYGEN-CONTAINING FIVE-AND SIX-MEMBER HETEROCYCLES

Minsk VESTSI AKADEMII NAVUK BSSR in Russian No 1, Jan 85
(manuscript received 30 Dec 83) pp 110-113

PETRYAYEV, Ye. P., KOSOBUTSKIY, V. S., VASIL'YEV, G. N. and SHADYRO, O. I., Scientific Research Institute of Physical Chemical Problems, Belorussian State University imeni V. I. Lenin

[Abstract] A study was made of the processes of radiation destruction occurring by a radical mechanism upon radiolysis of saturated oxygen-containing five- and six-membered heterocycles. Tetrahydrofuran, 1,4-dioxane, paraldehyde and trioxane were additionally purified by fractional distillation. Solutions were prepared with double distilled water and deaerated before irradiation. The end products were analyzed by GLC and GAC. The radicals of the five and six-membered saturated cyclical compounds containing oxygen atoms were found to fragment. As the number of oxygen atoms in the ring increases, the degree of destruction of the matter increases both as a result of more intensive sequential β splitting and due to coordinated decomposition of radicals containing two or more oxygen atoms in their rings. References 12: 9 Russian, 3 Western.
[187-6508]

UDC 541.15

## HETEROGENEOUS RADIOLYSIS OF CO IN PRESENCE OF $\gamma = Al_2O_3$

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 84, pp 51-53

RUSTAMOV, V. R., KURBANOV, M. A. and KERIMOV, V. K., Radiation Research Sector, AzSSR Academy of Sciences

[Abstract] A study is made of the influence of dose, electron fraction of $CO_2(\varepsilon)$ as well as irradiation temperature over a broad range of change (from -196 to +500°C) on the yield of carbon monoxide upon radiolysis of the heterogeneous system $\gamma = Al_2O_3 + CO_2$. The products of radiolysis of the system are carbon monoxide and hydrogen. Other possible products such as $O_2$ and $H_2O_2$ were not found. As radiation temperature was increased to 500°C, the rate of formation of carbon monoxide increased sharply and the radiation chemical yield of CO reached about 1 molecule per 100eV. Figures 2; references 7: 4 Russian, 3 Western.
[203-6508]

UDC 543.51:546.791.6:547.442.3

## MASS SPECTRA OF URANYL TRIFLUOROACETYLACETONATE ADDUCTS

Leningrad RADIOKHIMIYA in Russian Vol 27, No 1, Jan-Feb 85
(manuscript received 19 May 83) pp 13-18

ADAMOV, V. M., BELYAYEV, B. N., BEREZINSKIY, S. O., SIDORENKO, G. V., and SUGLOBOV, D. N.

[Abstract] A study was made of the mass spectra of adducts of uranyl trifluoroacetylacetonate $UO_2L_2 \cdot S$ (P) including labeled specimens enriched with $^{18}O$ in the uranyl group, where L is $CH_3COCHCOCF_3$, S is trimethylaminooxide (TMAO), trimethylphosphinoxide (TMPO), dimethylsulfoxide (DMSO), trimethylphosphate (TMP) and pyridine (Py). The mass spectra of the adducts contain a full set of ions formed upon fragmentation of the nonsolvated form of $UO_2L_2$ including metastable ions. A number of significant differences are observed in the fragmentation of the adducts and nonsolvated complex. All the differences are apparently explained by the fact that the presence of the neutral ligand leads to weakening of the bonds in the central cation with the β-diketonate ligands due to competition of ligands for interaction with vacant central cation orbitals. This work establishes certain specifics of the fragmentation of uranyltrifluoroacetylacetonate adducts: significant facilitation of separation of β-diketonate ligand, exchange of oxygen atoms between uranyl group and neutral ligand molecule. References 21: 9 Russian, 12 Western.
[202-6508]

UDC 546.791.6+547.341

## STUDY OF URANYL OXALATE COMPLEX WITH TRIBUTYL PHOSPHINOXIDE

Leningrad RADIOKHIMIYA in Russian Vol 27, No 1, Jan-Feb 85
(manuscript received 21 Apr 83; in final form 20 Apr 84) pp 19-23

KOBETS, L. V., DIK, T. A., BELYACHITS, G. F., UMREYKO, D. S., VOLODIN, I. A., ZHAVORONKOVA, T. V. and FILIPPOV, Ye. A.

[Abstract] Results are presented from spectral and thermal analysis of uranyl oxalate with one of the tertiary aliphatic phosphinoxides, tributylphosphinoxide (TBPO) - $UO_2C_2O_4 \cdot TBPO$. The results of chemical and thermogravimetric analyses yield equations for the processes of subsequent decomposition of the substances studied:

$$UO_2CO_3 \cdot TBPO \xrightarrow{350\text{-}400^\circ C} UO_2CO_3 + TBPO,$$

$$UO_2CO_3 \rightarrow UO_2 + CO\ O_2.$$

These equations represent the basic stages in decomposition of $UO_2C_2O_4 \cdot TBPO$, though the actual chemism of thermolysis of the compound is more complex, since the end product of decomposition contains 0.8-1% phosphorus. Figures 2; references 17: 13 Russian, 4 Western.
[202-6508]

UDC 541.451:546.799.5.6

## INFLUENCE OF QUARTZ ON THERMAL STABILITY OF $AmO_2$ and $CmO_2$

Leningrad RADIOKHIMIYA in Russian Vol 27, No 1, Jan-Feb 85
(manuscript received 17 May 83) pp 28-33

LYALYUSHKIN, N. V., SUDAKOV, L. V., BARANOV, A. Yu., SHIMBAREV, Ye. V., KAPSHUKOV, I. I.

[Abstract] When $AmO_2$ is heated in a reducing atmosphere the temperature at which decomposition begins is significantly reduced, from 1000 to about 150-200°C. However, in a number of studies of the thermal stability of $AmO_2$ performed without the use of hydrogen or other reducing agents, the temperature of decomposition of the dioxide was also observed to decrease. The purpose of this work was to explain the reasons for this behavior, particularly by studying the influence of melted quartz powder on thermal stability of $^{243}AmO_2$ and $^{244}CmO_2$. The reasons for the decrease in thermal stability of $AmO_2$ are apparently related to the creation in a sealed capillary of a reducing atmosphere. This results primarily from the liberation of various gaseous products such as $H_2O$, $CO_2$, CO and $H_2$ as well as volatile organic substances, from the surfaces of the quartz. Figures 2; references 10: 5 Russian, 5 Western.
[202-6508]

UDC 546.799.6+669.234

## SYNTHESIS AND STUDY OF BINARY COMPOUNDS OF ACTINOIDES AND LANTHANOIDES. VI. ALLOYS OF CURIUM WITH PALLADIUM

Leningrad RADIOKHIMIYA in Russian Vol 27, No 1, Jan-Feb 85
(manuscript received 17 May 83) pp 33-37

RADCHENKO, V. M., SELESNEV, A. G., SHUSHAKOV, V. D., RYABININ, M. A., LEBEDEVA, L. S., KARELIN, Ye. A. and VASIL'YEV, V. Ya.

[Abstract] The purpose of this work was to produce alloys of palladium with curium, prepare experimental specimens in the form of foils and study some of their properties. Two initial compositions were prepared with Pd/Cm ratios of 10 and 100. Sections of the foils produced were cut and dissolved in aqua regia. X-ray and chemical analyses served as the basis for estimation of the Pd-Cm state diagram on the palladium side. A rather broad area of solid solution of curium in the face-centered cubic lattice of palladium was observed, resulting apparently from the specific properties of the palladium. Experiments involving leaching of curium from the specimens were performed under standard conditions. Leaching involves extraction of radioactive isotopes from the disrupted crystalline lattice in addition to its dissolution. Figures 2; references 12: 7 Russian, 5 Western.
[202-6508]

UDC 543.21 546.723+54-36(541.18.043 045 05) + 546.56 48

## ULTRAMICROSCOPIC STUDY OF STATUS OF IRON (III) OXIDE USED AS RADIONUCLIDE ADSORBENT

Leningrad RADIOKHIMIYA in Russian Vol 27, No 1, Jan-Feb 85
(manuscript received 24 May 83) pp 42-46

NOVIKOV, A. I., GOLIKOVA, Ye. V., ZAKREVSKAYA, T. M., SAMOYLOVA, V. F., SHCHEKOTUROVA, Ye. K. and CHERNOVEREZHSKIY, Yu. M.

[Abstract] A study is performed to determine the number and size of particles contained in a background electrolyte solution and remaining after removal of the adsorbent from the solution by centrifugation or ultrafiltration. The model adsorbents were iron oxide and hydroxide. Centrifugation was performed at 500 g. Ultrafiltration was performed through nuclear filters produced by bombardment of Lavsan films with accelerated Xe ions at JINR in Dubna. In an actual polydispersed system consisting of particles of the same or similar composition but different radius, counting the number of particles in each position on the wedge allows determination of the relative distribution of particles by dimensions. The effectiveness of removal of suspended particles can be significantly increased by the use of ultrafiltration through nuclear filters in addition to centrifugation. Following centrifugation, the solution contains 82% particles larger than 0.1 μm, 12% particles 0.1-0.052 μm and 6% particles smaller than 0.052 μm. Figures 3; references 5 (Russian).
[202-6508]

UDC 541.15:541.127:546.799.5

## STUDY OF INFLUENCE OF ALPHA-RADIATION ON VALENT STATE OF ACTINOIDES. VII. REDUCTION OF AMERICIUM (V) IN NITRATE SOLUTIONS

Leningrad RADIOKHIMIYA in Russian Vol 27, No 1, Jan-Feb 85
(manuscript received 23 Jul 83) pp 59-64

FROLOV, A. A., CHISTYAKOV, V. M., KORNILOV, A. S. and VASIL'YEV, V. Ya.

[Abstract] Results are presented from a study of the radiation-chemical reduction of americium (V) in nitrate solutions over a broad range of composition of solution and dose power of internal alpha-radiation. The radiation-chemical behavior of americium (V) ions was studied with a dose power of $5 \cdot 10^{-3}$ - 6.5 wt/l, nitric acid concentration 0.01-8.6 mole/l, lithium nitrate 0-9 mol/l and initial americium (V) concentration 1.1-6.3 mmol/l. Under all of these conditions, americium (V) is converted only to americium (III). The formation of americium (VI) was not observed even at high values of $C_{HNO_3}$ and $C^{o}_{Am(V)}$ and low dose powers. Special experiments studied the variation in initial rate of reduction as a function of initial concentration of americium (V) under various conditions. The experiments indicated the radiation-chemical nature of the reactions responsible for the first two terms of the equation describing the reaction rate, though the third term is proportional to the square of concentration of americium (V), increases with increasing nitric acid concentration, and is independent of dose. This term represents the rate constant of the reaction of disproportionation of americium (V). Figures 8; references 12: 9 Russian, 3 Western.
[202-6508]

UDC 545.15

## RADIOLYSIS OF TRICHLOROBENZENE. II. STUDY OF COMPOSITION OF LOW MOLECULAR WEIGHT PRODUCTS OF RADIOLYSIS

Leningrad RADIOKHIMIYA in Russian Vol 27, No 1, Jan-Feb 85
(manuscript received 22 Jul 83) pp 70-72

ZAGORETS, P. A., FILIPPOV, Ye. A., BULGAKOVA, G. P., SMETANNIKOV, Yu. B., VIRIN, L. I. and POPOVA, I. Yu.

[Abstract] Low molecular weight products of radiolysis of trichlorobenzene were studied by gas-liquid chromatography, chromato-mass-spectrometry and potentiometric titration. The identified products of radiolysis of TCB include chlorobenzene, dichlorobenzene isomers, HCl and an unidentified polymer. Analysis of the nature of the products indicates a significant contribution of processes of radiation-initiated isomerization of 1,2,4-TCB, preferentially to the 1,2,3-state. Chlorination and dechlorination of TCB also occur. The polymer fraction contains primarily polychlorodiphenyls. References 7: 1 Russian, 6 Western.
[202-6508]

UDC 541.15: (546.799.3+546.799.4+546.791)

# REACTIVITY OF NEPTUNIUM, PLUTONIUM AND URANIUM IONS FOR PRIMARY PRODUCTS OF RADIOLYSIS OF WATER

Leningrad RADIOKHIMIYA in Russian Vol 27, No 1, Jan-Feb 85
(manuscript received 25 May 82) pp 127-130

SHILOV, V. P., FEDOSEYEV, A. M. and PIKAYEV, A. K.

[Abstract] The method of pulse radiolysis with optical recording of short-lived particles was used to determine the absolute rate constants of the reaction of ions of neptunium, plutonium and uranium in aqueous solutions. The source of ionizing radiation was a 5 MeV electron accelerator, pulse length 2.3 μs. The data obtained allowed the mechanism of gamma-radiolysis of solutions of neptunium, plutonium and uranium to be refined. Reactions previously used to explain the specifics of the processes occurring are shown in this article to be impossible. References 11: 6 Russian, 5 Western.
[202-6508]

RUBBER AND ELASTOMERS

UDC 66.048.3:[661.7:547.245'211'113]

## OPTIMAL TECHNOLOGY FOR FRACTIONAL DISTILLATION OF METHYL CHLOROSILANES AND ITS PRACTICAL APPLICATION

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 3, Mar 85 pp 142-144

FILIPPOV, G. G., KORABLINA, T. P., SHEVYREVA, L. I. and SOKOLOV, N. M.

[Abstract] Description is provided of the theoretical and practical approaches and rationale for the resolution of a 14-component mixture (dichlorosilane, trimethylchlorosilane, dimethyldichlorosilane, ethyldichlorosilane, etc.) by fractional distillation. For the development of an optimal scheme, reliance was placed on solving problems pertaining to the delineation of the vapor stream required under conditions of minimum level reflux ratio, as described by G. G. Filippov [in: 3rd All-Union Conf. on the Theory and Practice of Fractional Distillation, No 1, Severodonetsk, 1973, p 193 (in Russian)]. In the final analysis, resolution of methyl chlorosilanes requires the use of a series of recycling schemes to optimize yields and minimize losses of desired components, utilizing at least six different reflux columns. Figures 2; references 6: 5 Russian, 1 Western.
[230-12172]

UDC 66.095.253.7:[661.7:547.551.2]

## SYNTHESIS OF N-($C_7$-$C_9$)ALKYL-N'-PHENYL-p-PHENYLENEDIAMINE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 3, Mar 85 pp 146-148

SKRIPKO, L. A., TROTYANETSKAYA, V. L., POPOV, L. K., PODERYAGIN, G. M., GUTMAN, G. M., KULAGIN, A. G., SOLOV'YEV, V. N., ROMANOV, R. S. PETROVA, N. N. and MAKOGON, A. M.

[Abstract] A synthetic method was devised for the preparation of N-($C_7$-$C_9$)-alkyl-N'-phenyl-p-phenylenediamine (I), an important stabilizer of synthetic rubbers. Availability of a Soviet source of I, also designated as C-789, would eliminate reliance on SKI-3 (a mixture of antioxidants). The approach consisted of alkylation of p-aminodiphenylamine with a mixture of fatty alcohols (($C_7$-$C_9$) to give I, with the following conditions favoring an optimal course of reaction: 150-240°C temperature, molar ratio of p-aminodiphenylamine:fatty alcohol mixture = 1:2, and 7% KOH (catalyst) in relation to p-aminodiphenylamine, with a reaction time of 3-3.5 h. After alkylation the reaction mixture was neutralized with 25% sulfuric acid, potassium sulfate removed by filtration, and excess alcohols eliminated by distillation. The yield of I ranged from 98 to 99%. Figures 1; references 13: 1 Czech, 4 Russian, 8 Western.
[230-12172]

WATER TREATMENT

UDC 628.163(088.8)

## UTILIZATION OF LIQUID WASTES OF VANADIUM INDUSTRY

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 28, No 2, Feb 85 (manuscript received 21 Aug 83) pp 62-65

KUTSENKO, S. A., YUKSEYEVA, L. A. and KUDRYASHOV, V. P., Chair of Inorganic Substances Technology, Perm Polytechnic Institute

[Abstract] Technical details are presented on a column method for the purification of waste waters from a vanadium production plant, using reduction by scrap iron with subsequent neutralization with sodium carbonate. Tests at 25°C demonstrated that vanadium, chromium and manganese were reduced to acceptable levels. In addition, use of excess sulfuric acid (up to 3%) resulted in virtually complete removal of chromium from samples with elevated concentrations of this element. Assessment of the effects of temperature on this process showed that high temperatures (ca. 80°C) resulted in diminution of the reductive activity of the scrap iron and, hence, decreased the efficiency of the process. Under the conditions employed, maximum efficiency was obtained at 20-25°C, with final pH of the reduced water of 3.0-3.5, a contact time of 3 min, 1.6-2.0 g/liter of scrap iron, and a demand for 4-5 g/liter of soda for neutralization. The final levels of Cr(VI) and V(V) in the purified water were on the order of 0.002 mg/liter. Figures 2; references 5 (Russian).
[219-12172]

UDC 628.543.5

## BIOCHEMICAL PURIFICATION OF NITROGENOUS WASTE WATER

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 2, Feb 85 pp 86-87

KOVALEV, V. G. and KOVALEVA, N. G.

[Abstract] Optimum biochemical purification requires a balance between nitrogenous and organic wastes. Maintaining an optimum regime can increase the oxidative potential by an average of 10% in aeration tanks treating commercial chemical wastes with high nitrogen content. This requires maintaining the ratio between the change in chemical oxygen demand and the change in nitrogen content in the range 9-12. If insufficient organic matter is present, easily biodegradable organic substances, such as methanol, should be added. Figures 2; references 5 (Russian).
[226-12672]

UDC 66.013.7:628.1

## EFFECTS OF WASTE WATERS ON QUALITY OF INDUSTRIAL WATERS IN KAMA RESERVOIR FOLLOWING FLOODING

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 3, Mar 85 pp 170-171

AMIROVA, S. A., BERDICHEVSKIY, N. I., PAVLOV, V. Ya. and BERDINSKIKH, A. G.

[Abstract] Water quality studies were conducted on the Kama river in the Berezniki industrial area to assess the difficulties encountered in treating water for use at the Berezniki Nitrogen Fertilizer Plant. The results showed high salt concentrations, particularly in the slow-flowing bottom layers, due to discharge from upstream chemical plants, and/or backflow from settling tanks. Virtual bottom standstill was the rule after flooding, resulting in increased salt levels in the river and presenting downstream plants with increasing purification problems. The problems are further complicated by the Kama Hydroelectric Power Station, which fails to properly treat its discharge. This situation calls for more stringent control of water quality in the area along with greater flexibility to meet the needs for water of the industrial users. Figures 2.
[230-12172]

UDC 628.543.665.6

## PURIFICATION OF OIL REFINERY WASTEWATER TO REMOVE PETROLEUM PRODUCTS BY THE USE OF NEW WATER-SOLUBLE POLYMERS

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 84, pp 87-89

POKATILOVA, S. D., GUSEYNOV, A. G., MAMEDOV, M. F. and MUSLIM-ZADE, Z. M., All-Union Scientific Research Technologic Institute for Production and Processing of Low Molecular Weight Olefins

[Abstract] Results are presented from studies of purification of wastes using inexpensive, noncarcinogenic polyelectrolytes in the 'VO' series of ionomers as polymer flocculants. The water soluble polymers were tested with actual industrial waste under laboratory conditions on an installation including a stage of mixing of the wastes with mineral coagulant and water soluble polymer flocculant with subsequent settling for 0.5 to 3 hours. The coagulants were used as a 1% aqueous solution, the flocculant as a 0.1% aqueous solution. The wastes had the following composition: dry residue 10,000-13,000 mg/l, petroleum products 40-1200 mg/l, constant hardness 40-80 mg-eq/l, suspended matter 40-1,000 mg/l, pH 7-9.0. As the dose of flocculant was increased with constant quantity of coagulant, the degree of purification of the wastes of petroleum products increased when aluminum sulfate and iron chloride were used as coagulants. A mixture of salts of aluminum and iron is more effective than either alone. Under optimal conditions the degree of purification with VO-75 is 90-100%. Figure 1; references 3 (Russian).
[203-6508]

UDC 541.183.5

## STUDY OF ADSORPTION OF DYE ON POLYSORB 40/100 FROM AQUEOUS SOLUTIONS

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 7, No 1, Jan-Feb 85 (manuscript received 23 May 83) pp 3-5

PODLESNYUK, V. V. and LEVCHENKO, T. M., Institute of Colloid Chemistry and Water Chemistry imeni A. V. Dumanskiy, Ukrainian SSR Academy of Sciences, Kiev.

[Abstract] This work dealt with determination of the adsorption capacity of polysorb 40/100 with respect to dyes of various classes and determination of the influence of structure and dimensions of dye molecules, their association and ionization and changes in electron structure of dye molecules on adsorption. Dye adsorption isotherms were measured in studies of sodium chloride solutions of known concentration. Contact time between polysorb and dye solutions was 14 days. The equilibrium concentration of indigo carmine and congo red after adsorption was determined colorimetrically after settling of the solution with an error of not over 2%. Figures 4; references 14: 12 Russian, 2 Western.
[197-6508]

UDC 677.3;027:628.3

## CLARIFICATION OF WASTEWATER WITH OZONE IN FLOATING LOAD FILTER

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 7, No 1, Jan-Feb 85 (manuscript received 21 Mar 83) pp 33-35

NAZAROV, B. G. and FAZULLINA, E. P., Central Scientific Research Institute of the Gear Industry, Moscow

[Abstract] A method is developed for clarification of wastewater from a painting and finishing plant by ozonation with simultaneous removal of suspended matter in a single apparatus with a floating load. Polystyrene foam beads 1-3 mm in diameter, both uncoated and coated with $MnO_2$, were used as the packing material. The results of the experiments were evaluated based on mass transfer coefficient, clarification factor, absorption of ozone and specific consumption of ozone for clarification of 1 mg of dye. The packing used was compared to packings of activated carbon with or without $MnO_2$ coating, polystyrene, silica gel and activated carbon coated with $Fe_2O_3$. The new packing was found to have significant advantages over the traditional packings, though absorption of ozone was less than for activated carbon coated with $MnO_2$. Figures 2; references 5 (Russian).
[197-6508]

UDC 66.012.44

## OPERATION OF VORTEX APPARATUS IN INDUSTRIAL WATER PREPARATION SYSTEMS

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 7, No 1, Jan-Feb 85
(manuscript received 28 Mar 83) pp 35-38

KOLANOVSKIY, A. M., SEMENYUK, V. D., SHVIDENKO, V. Z. and MURAV'YEV, V. R., Institute of Colloid Chemistry and Water Chemistry imeni A. V. Dumanskiy, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] A technology has been developed for softening of water with ammonia at pH 10-10.5 in vortex reactors filled with fine sand fractions. Ammonia ions are removed from the softened water on an H-cation filter, allowing spent regeneration solutions to be used as liquid ammonia fertilizers. The planned throughput of one vortex reactor is 240 $m^3$/hr. Under actual operating conditions during the startup period it reached 150 $m^3$/hr, then increased to 230-240 $m^3$/hr with further operation. Sand fractions with particle diameters less than 0.5 mm are most effective in the apparatus. The particles removed from the bottom of the funnel-shaped reactor consist of a sand core representing up to 25% of the mass of the granule plus a mixture of $CaCO_3$ and $Mg(OH)_2$. The quality of water produced by the new installation is approximately equivalent to that produced by the traditional softening process. Figures 2; references 3 (Russian).
[197-6508]

UDC 628.337

## ELECTROCHEMICAL PURIFICATION OF CHROMIUM-CONTAINING WASTEWATER

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 7, No 1, Jan-Feb 85
(manuscript received 19 Apr 83) pp 43-45

ROGOV, V. M., SHVETSOVA, T. L. and FILIPCHUK, V. L., Ukrainian Institute of Water Management Engineers, Rovno

[Abstract] A study was made of the process of changing pH and Eh in chromium-containing solutions as well as the redistribution of concentration of Cr (VI) in the anode and cathode chambers of a diaphragm-type electrolyzer in order to determine optimal conditions for subsequent treatment of water in the electrolyzer with soluble steel anodes. Studies on the migration redistribution of Cr (VI) were performed in a sealed diaphragm-type electrolyzer with graphite electrodes with separation of the anolite and catolite by an inactive diaphragm. The change in Cr (VI) content, pH and Eh of catolite and anolite was studied as a function of specific quantity of electricity, current density, initial pH, $Na_2SO_4$ concentration and diaphragm material. Current consumption was found to have the determining influence on pH and Eh as well as migration redistribution of Cr (VI). The presence of $Na_2SO_4$ also significantly

influences the process of Cr (VI) migration. Up to 85-95% of the Cr (VI) can be concentrated in the anode chamber by the process, and optimal values of pH and Eh of anolite can be obtained, corresponding to stable ionization of steel anodes in subsequent reduction of Cr (VI) by ions of Fe (II). Figures 4; references 6: 5 Russian, 1 Western.
[197-6508]

UDC 628.016

ANODIC DISSOLUTION OF IRON IN GROUNDWATER CONTAINING STRONTIUM

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 7, No 1, Jan-Feb 85
(manuscript received 1 Mar 83) pp 48-50

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[Abstract] A technology is developed for removal of strontium from water by an electrochemical method in an electrolyzer with a soluble iron anode, allowing the concentration of strontium to be decreased in the water processed in an alkaline medium from 40-50 mg/l to the maximum permissible concentration of 2 mg/l at low current density (not over $0.1 \cdot 10^{-2} A/cm^2$). Experiments were performed on a continuous action installation with a throughput of 20 l/hr groundwater. The process of removal of strontium by electrocoagulation is most effective in an alkaline medium at low current density. At pH 7 and current densities $0.1 \cdot 10^{-2}$ $A/cm^2$ the concentration of strontium is decreased from 60 to 38.4 mg/l, while at pH 9.5 it drops to 1.4 mg/l, amounting to removal of 98% of the strontium. Increasing current density results in a significant increase in residual strontium concentration in the output water. Figure 1; references 7 (Russian).
[197-6508

UDC 628.334.153:[661.7:547.491.8]

PREPARATION FOR UNDERGROUND BURIAL OF TRIAZINE PRODUCTION WASTEWATER

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 7, No 1, Jan-Feb 85
(manuscript received 21 Jan 83) pp 50-51

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[Abstract] The purpose of this work was to determine the possibility of underground burial of wastewater from the production of atrazine and simazine. The characteristics and conditions of production of wastewaters were studied, as well as the compactibility of ground water with atrazine and simazine production wastewater pumped into absorbing soil at a depth of about 1050 m. The studies showed that atrazine production wastewater can be purified by precipitation of organic impurities at pH 5.5-7, but full precipitation of the sediment requires 2-2.5 days. The decantate of mixed wastewater is unstable in an alkaline medium; therefore the wastewater should be maintained at a pH of not over 6 when it is pumped into the ground. Figures 2; references 2 (Russian).
[197-6508]

UDC 628:162.8

## TREATMENT OF WATER WITH OZONE TO RENDER PESTICIDE DNOK HARMLESS

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 7, No 1, Jan-Feb 85
(manuscript received 21 Jun 83) pp 52-54

VAKULENKO, V. F., TARAN, P. N. and SHEVCHENKO, M. A., Institute of Colloid Chemistry and Water Chemistry imeni A. V. Dumanskiy, UkSSR Academy of Sciences, Kiev

[Abstract] Destructive oxidation of 2,4-dinitro-6-methylphenol (DNOK) in dilute aqueous solutions was performed to determine conditions necessary for decontamination of nitrophenol derivatives. The preparation tested was purified by double crystallization from alcohol. Breakdown of the pesticide and its conversion products was monitored by chromatography and photometric analysis. To estimate the influence of pH on the reaction rate, the studies were performed in phosphate and borate buffers. Ozonation of DNOK caused a significant drop in solution pH. The studies showed that ozonation of aqueous solutions of DNOK causes its destruction over a broad pH range with low ozone consumption. Figures 4; references 12: 10 Russian, 2 Western.
[197-6508]

UDC 628.337:628.387

## ELECTROCHEMICAL PURIFICATION OF WASTEWATER FROM PRODUCTION OF NITRO- AND AMINO-PRODUCTS

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 7, No 1, Jan-Feb 85
(manuscript received 10 Mar 83) pp 54-56

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[Abstract] Electrochemical purification of aniline dye production wastewaters containing sodium chloride has been successfully tested on wastewater from production of dyes and pyrocatechin. A study is presented of this process for wastewaters from the production of aromatic nitro- and amino-compounds. Electrochemical purification was performed both by the traditional method and by a method involving the method of mathematical planning of experiments. Experiments were performed on a laboratory electrolyzer, a model of a commercial sodium chlorate electrolyzer using ruthenium oxide anodes. The results of the detailed factorial experiments were used to calculate regression coefficients and obtain linear regression equations with respect to degree of purification, content of active chlorine and content of sodium chlorate. Optimal conditions of electrochemical purification of these waters are 90°C, pH 4-5, concentration of nickel catalyst 0.2-0.3 g/l, electric power consumption 31.4 A·hr/l. The purified wastewaters are colorless and contain no nitro- or amino compounds. References 4 (Russian).
[197-6508]

UDC 541.183.552.52

## CLARIFICATION OF WASTEWATER AFTER CONCENTRATION OF ILMENITE ORES

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 7, No 1, Jan-Feb 85
(manuscript received 22 Apr 83) pp 61-63

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[Abstract] A study is reported of the first stage of dewatering of slurry formed upon concentration of ilmenite ores, the process of thickening of the slurry in a gravitational field. The kaolin slurry was studied after it was drained from a hydrocyclone at an operating mining and concentration combine. The solid phase concentration in the slurry was 30-33 kg/m$^3$, consisting 95-98% of kaolinite, remainder individual grains of ilmenite, quartz, carbonates, zeolites, hematite and hydrohematite. PAA is the most efficient flocculant for thickening of kaolin suspensions after concentration of ilmenite ores. The rate of precipitation of the slurry increases with increasing PAA concentration, reaching the maximum at 0.105 kg/m$^3$. Equilibrium is reached between gravitational and surface forces after twenty-four hours exposure. When wastes are to be thickened to a concentration of 100 kg/m$^3$, the processes of clarification and thickening should be performed in separate apparatus. Figures 3; references 7 (Russian).
[197-6508]

UDC 628.33

## FINAL PURIFICATION OF WASTEWATER ON A HYDROAUTOMATIC BIOFILTER-FILTER WITH FLOATING LOAD

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 7, No 1, Jan-Feb 85
(manuscript received 12 Apr 83) pp 69-73

YAKIMCHUK, B. N., ZHURBA, M. G., PRIKHOD'KO, V. P. and SHEVCHUK, B. I., Central Scientific Research Institute of Combined Utilization of Water Resources, Kishinev; 'Azot' Production Association, Rovno

[Abstract] In order to intensify the process of biochemical final purification of wastewaters, a method has been developed consisting of filtration of the wastewater through a floating load periodically saturated with oxygen of the air. The filter is loaded with polystyrene beads 0.8-10 mm in diameter, charge depth 120 cm. Filtration is formed in the direction of decreasing granule diameter. Experimental studies of the process of final purification of mixed domestic and industrial wastewater was performed on a pilot-scale device with a throughput of 400 m$^3$/day, 1 x 1 m in plan and 4 m high. Periodic saturation of the charge with oxygen from the air intensifies the biochemical processes occurring in the filter layer. The duration of the filtration cycle with a concentration of suspension in the initial water of up to 30 mg/l should be not over 3 days to avoid plugging of the filtering charge. Figures 5; references 7: 6 Russian, 1 Western.
[197-6508]

UDC 628.387:621.182.12

## OPTIMIZATION OF DEAMMONIZATION AND SOFTENING OF INDUSTRIAL AND RESIDENTIAL WASTEWATERS FOR THERMOELECTRIC POWER PLANTS

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY MINISTERSTVA VYSSHEGO I SREDNEGO SPETSIAL'NOGO OBRAZOVANIYA SSSR: ENERGETIKA in Russian No 4, Apr 85 (manuscript received 20 Jun 83) pp 65-69

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[Abstract] Mathematical and economic analyses were conducted on optimum procedures for the removal of single charged ammonium ions and doubly charged metal ions responsible for waste water hardness. Several cation-exchange procedures were analyzed, with the demonstration that the cation-exchanger KU-2 and sulfonated coal can be employed in several stages to assure optimum elimination of hardness and ammonia to render industrial and residential waste water suitable for use at thermoelectric power plants. Using an optimum scheme for water treatment, the cost of Na-cation water can be reduced to 5.4 kopecks/$m^3$. Figures 2; references 5 (Russian).
[247-12172]

UDC 621.187:541.1.001

## CALCULATION OF CARBONATE STATUS OF SEAWATER WITH RECIRCULATION OF CARBON DIOXIDE IN INSTANTANEOUS EVAPORATORS

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY MINISTERSTVA VYSSHEGO I SREDNEGO SPETSIAL'NOGO OBRAZOVANIYA SSSR: ENERGETIKA in Russian No 4, Apr 85 (manuscript received 26 Dec 83) pp 70-74

LUKIN, G. Ya., doctor of technical sciences, and KALASHNIK, V. V., engineer, Kaliningrad Technical Institute of Fisheries and Economy

[Abstract] Acidification of water is an effective means of avoiding scale buildup, and has been suggested for use in instantaneous evaporators via recirculation of carbon dioxide. A mathematical analysis was conducted on the efficiency of the carbon dioxide recirculation system in 6A-25-OM4 apparatus to achieve desalination, relying on a six-stage process. Computer-based calculations have shown optimal operation parameters with control of carbon dioxide loss and pH adjustment to avoid corrosion due to alkalinity. With concrete examples provided for evaporators used aboard ships, it was shown that a three step process was sufficient to increase the carbon dioxide saturation and decrease the pH of the recirculating water to the level where the carbonate buildup was sufficient to prevent scales. Figures 3; references 5: 3 Russian, 2 Western.
[247-12172]

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# INITIAL STAGES IN THERMAL DESTRUCTION OF VARIOUS CELLULOSES

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 39, No 4, Apr 85
(manuscript received 14 Mar 84) pp 340-343

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[Abstract] Since analysis of the thermal process of cellulose destruction may serve as an indicator of a given sample for industrial applications, kinetic studies were conducted on thermal decomposition of wood, flax and cotton celluloses at 423-473°K. Determinations of the energies of activation for the respective samples yielded values of 26.37, 10.40 and 18.08 kcal/mole, respectively, indicating that flax cellulose is the least stable of the celluloses tested with respect to thermal treatment. The respective entropies of activation for the flax, cotton and wood cellulose were -54.2, -37.4 and -34.5 e.u.. The data indicated that thermal treatment of cellulose diminishes the degree of randomness, i.e., that in addition to breaking glycosidic bonds, heat treatment favored the formation of a more compact structure. In conjunction with the fact that the entropy of activation was most negative for flax cellulose, as well as the fact that the rate of destruction was slower than for the other celluloses, flax cellulose appears in fact to possess the highest thermal stability, despite the low energy of activation. Figures 1; references 11: 9 Russian, 2 Western.
[229-12172]

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